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Zegley, Christopher R.; Lewis, Chavius G.; Johnson, Derek N.; Denmond, Constance M.

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# NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

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## MBA PROFESSIONAL REPORT

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**Combinatorial Auction Theory Applied to the  
Selection of Surface Warfare Officer Retention Incentives**

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**By: Constance M. Denmond,  
Derek N. Johnson,  
Chavius G. Lewis,  
and Christopher R. Zegley  
December 2007**

**Advisors: William R. Gates,  
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<b>REPORT DOCUMENTATION PAGE</b>			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> December 2007	<b>3. REPORT TYPE AND DATES COVERED</b> MBA Professional Report	
<b>4. TITLE AND SUBTITLE</b> Combinatorial Auction Theory Applied to the Selection of Surface Warfare Officer Retention Incentives			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Constance Denmond, Derek Johnson, Chavius Lewis, and Christopher Zegley				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING/MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Approved for public release; distribution is unlimited.			<b>12b. DISTRIBUTION CODE</b>	
<b>13. ABSTRACT (maximum 200 words)</b> <p>The purpose of this project is to find the optimal combination of retention base incentives offered by the Surface Warfare Officer (SWO) community. The SWO community has experienced the lowest junior officer retention rate of all Unrestricted Line Officer (URL) communities since the early 1990's. The community is required to maintain at least 275 junior officers annually, in order to fill operational Department Head billets, in support of sustaining maritime mission requirements. Due to numerous community dissatisfiers, the SWO community has been unable to produce the required force strength of 275 Department Heads. Induction of a monetary bonus was the SWO community's answer to addressing its critical junior officer retention rates. But retention rates are still critically low and are viewed negatively by many junior officers, because the monetary bonus doesn't address the reasons junior officers are dissatisfied with the community. Several non-monetary incentives have been identified by junior SWO as possible tools to increase retention rates. This project will build a Combinatorial Auction Model to include both monetary and non-monetary incentives to determine which combination offers the greatest value to officers, at least cost to the Navy's SWO community.</p>				
<b>14. SUBJECT TERMS</b> Surface Warfare Officer, SWOCP, JO CSRB, Geographical stability, Telecommuting, Sabbatical, Fleet, Naval Postgraduate School			<b>15. NUMBER OF PAGES</b> 122	
			<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UU	

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18

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**COMBINATORIAL AUCTION THEORY APPLIED TO THE  
SELECTION OF SURFACE WARFARE OFFICER RETENTION INCENTIVES**

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Submitted in partial fulfillment of the requirements for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

from the

**NAVAL POSTGRADUATE SCHOOL  
December 2007**

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# **COMBINATORIAL AUCTION THEORY APPLIED TO THE SELECTION OF SURFACE WARFARE OFFICER RETENTION INCENTIVES**

## **ABSTRACT**

The purpose of this project is to investigate the potential retention and cost impacts of offering combinations of retention base incentives to members of the Surface Warfare Officer (SWO) community. The SWO community has experienced the lowest junior officer retention rate of all Unrestricted Line Officer (URL) communities since the early 1990s. The community is required to maintain at least 275 junior officers annually, in order to fill operational Department Head billets, in support of sustaining maritime mission requirements. Due to numerous community dissatisfiers, however the SWO community has been unable to produce the required force strength of 275 Department Heads. Introduction of a monetary bonus was the SWO community's answer to addressing its critical junior officer retention rates. Nonetheless, retention rates are still critically low and are viewed negatively by many junior officers, because the monetary bonus does not address the reasons junior officers are dissatisfied with the community. Several non-monetary incentives have been identified by junior SWOs as possible tools to increase retention rates. This project will build a Combinatorial Auction Model to include both monetary and non-monetary incentives to determine how combinations of incentives can be used to offer the greatest value to retained officers, at the least cost to the Navy's SWO community.



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## **ACKNOWLEDGMENTS**

We would like to thank CAPT Dave Adler, CDR Anthony Parisi, LCDR Kevin Austin, CDR (ret) Michael McMaster, Fran Horvath, Alice Crawford, Bill Gates, and Peter Coughlan for always providing guidance and advice throughout the duration of this project. A special thank you is extended to Nancy Sharrock for her technical assistance and expertise. Without your expertise, and patience this study could not have reached completion. Thanks for believing in us.

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## **I. INTRODUCTION**

### **A. PURPOSE**

The purpose of this project is to investigate the potential retention and cost impacts of offering combinations of retention base incentives to members of the Navy's Surface Warfare Officer (SWO) community. The SWO community has experienced the lowest junior officer retention rate of all Unrestricted Line Officer (URL) communities since the early 1990's. The community is required to maintain at least 275 junior officers annually to fill operational Department Head billets and sustain maritime mission requirements. Due to numerous community dissatisfiers, however, the SWO community has been unable to produce a stable stream of Department Heads. Introducing a monetary bonus was the SWO community's initial answer to address its critical junior officer retention rates. Today, however, retention rates remain critically low primarily because the monetary bonus doesn't adequately address the needs of the current generation of junior officers coming into the Navy. Previous research conducted identified several non-monetary incentives that junior SWOs viewed as possible tools to increase retention rates. This project will build a Combinatorial Auction Model to include both monetary and non-monetary incentives to determine how combinations of incentives can be used to offer greater value to officers at a lower cost to the Navy's SWO community.

### **B. ORGANIZATION OF STUDY**

Chapter I explains the purpose of this MBA Project and the questions that this project will attempt to answer. Chapter II provides a literature review on the background of the Surface Warfare Community and the problems with retaining SWOs in general, and more specifically the retention problems that exist at the Department Head level. Chapter III lays out our survey findings and provides some insight into the monetary values that SWOs assign to a variety of retention factors. It will also serve to identify the continuing problems with retention and motivation in the Surface Warfare community. Chapter V will provide a model which will allow officers to choose from a variety of

monetary and non-monetary incentives in an effort to get them to reveal their true value of a combination of incentives. Chapter IV will discuss some of the open ended questions in our survey in an effort to capture any recurring themes that become evident in our survey responses. Chapter VI will provide a conclusion to our project and will offer recommendations for further research in this area of study.

### **C. RESEARCH QUESTION**

This research answers the following questions regarding the efforts of the Navy to retain Surface Warfare Officers at the Department Head level:

- Primary Question:
  - How might offering a combination of non-monetary incentives, in addition to SWOCP assist the Navy in closing the gap at the SWO Department Head level?
- Secondary Question:
  - Why are Surface Warfare Officers continuing to leave the Navy prior to their Department Head Tours?
  - What incentive(s) do SWOs value most?
  - What value in terms of dollars do SWOs assign to their preferred incentives?
  - How might a combinatorial auction mechanism be used to determine both which officers should be retained, determine which incentives should be given to each retained officer, and simultaneously minimize the overall retention cost for the Navy?

### **D. SCOPE AND METHODOLOGY**

The purpose of this project is to investigate the potential retention and cost impacts of combination of retention base incentives the Surface Warfare Officer (SWO) community. It will begin with the accession of Surface Warfare Officers, SWOCP history, and an assessment of factors leading to low retention in the Surface Warfare Officer community. The authors designed and administered a survey to a portion of the fleet, to determine other factors for lateral transfers to other communities and resignations from the SWO community. The survey will also introduce the theory of multiple attribute auctions, in combination with SWOCP, to determine the value a junior officer

places on homeport, ship class, and billet. We completed a review of the latest *Surface Warfare Officer Vital Signs* to determine the current number of department heads that have accepted SWOCP. A review of age, ethnicity, commissioning source, homeport location, and number of dependents will be completed to determine if these variables have a direct effect on retention.

The methodology for this MBA project will be a combination of qualitative and quantitative data. Our data collection method will consist of the following methods:

- Distribute a survey to NPS students and the fleet.
- Collect data from the work-life balance conference held at the Naval Postgraduate School.
- Obtain data from PERS-41 concerning the current state of the SWOCP contracts accepted by specific year groups.
- Perform a statistical analysis of age, ethnicity, years of service, commissioning source, number of dependents and rank.
- Reviewing the monetary amounts that survey respondents indicated in their responses.

The survey was first conducted on Surface Warfare Officers currently attending the Naval Postgraduate School Surface. The survey was then distributed to navy ships around the world. We believe that our survey revealed that Surface Warfare Officers place a high value on their ability to choose their particular ship type, homeport, and billet. Our survey consisted of 18 questions, and was estimated to take approximately 15 minutes to complete. The primary target groups for the survey are those Surface Warfare Officers who have or have not completed their initial division officer tours and have not yet signed a contract accepting SWOCP or submitted a request for resignation from active duty. In the design of our survey we included basic demographic questions such as ethnicity, commissioning source, number of dependents, and the highest level of education completed.

Our choice to administer a web based survey using Survey Monkey was based on the benefits derived from using such a survey method. This survey method provides a variety of benefits although not without some corresponding drawbacks.<sup>1</sup> In our case,

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<sup>1</sup> Reynolds & Rodney A, 2007.

based on the geographical dispersion of our sample audience and their corresponding relative ease of access to the internet (in most cases) this survey method proved to be the most appropriate for our purposes. Additional benefits and drawbacks are listed below.

Survey Approach	Benefits	Drawbacks
Web-based	<ul style="list-style-type: none"> <li>• Turnaround time (quick delivery and easy return)</li> <li>• Ease of reaching large number of potential respondents</li> <li>• Can use multiple question formats</li> <li>• Data quality checking</li> <li>• Ease of ensuring confidentiality</li> <li>• Can provide customized delivery of items</li> <li>• Can capture data directly in database</li> </ul>	<ul style="list-style-type: none"> <li>• Time-consuming development</li> <li>• Potential for limited access within target population</li> <li>• Potential for technology problems to decrease return rate</li> <li>• Security issues may threaten validity or decrease return rate</li> <li>• Lack of control over sample</li> <li>• Potential for bias in sample</li> </ul>

**Table 1. Web-based survey pros and cons**

**Source: From Handbook of Research on Electronic Surveys and Measurements**

Survey Monkey is a licensed survey web engine utilized by the Naval Post-graduate School. The survey was distributed, collected, and completed anonymously as follows to the designated groups:

Sample Group	Survey Open Date	Survey Close Date
<ul style="list-style-type: none"> <li>• NPS Students</li> <li>• Junior SWOS afloat</li> </ul>	<ul style="list-style-type: none"> <li>• 26 JUL 2007</li> <li>• 13 AUG 2007</li> </ul>	<ul style="list-style-type: none"> <li>• 10 AUG 2007</li> <li>• 25 AUG 2007</li> </ul>

**Table 2. Web-based survey open/close dates**

The survey was distributed to the Naval Postgraduate School Surface Warfare Officers during the summer quarter of academic year 2007 via email. These officers were given two weeks to complete the survey, with a reminder email sent at the end of the first week, and two days prior to the survey deadline. The survey was also distributed to junior SWOs serving on ships throughout the fleet. In both cases the survey audience

was notified of the survey via email. The students at NPS were requested to take the survey via the senior SWO on campus. For the afloat units, emails were sent by Professor Gates, Associate Dean for Research in the Graduate School of Business and Public Policy at the Naval Postgraduate School, in coordination with our project team, to 110 Commanding Officers serving on afloat units. The ships chosen for the survey were platforms on which typical junior SWOs serve for their first and second Division Officer tours. Ship types included: Frigates (FFG), Destroyers (DDG), Cruisers (CG), Dock Landing Platforms (LPD), and Dock Landing Ships (LSD). They are located throughout a variety of fleet concentration and deployed locations to include Norfolk, San Diego, Yokosuka, Bahrain, Jacksonville, Pearl Harbor and Everett. Commanding Officers were asked to distribute the survey information to their junior officers however; they themselves would have no visibility over the individual responses of the officers under their command. It was noted in the survey that participants would be allowed to view the results upon the completion of the survey research.

To analyze the data, we used Microsoft Excel to create spreadsheets that will capture ethnicity, number of dependents, commissioning source, and education completion level. We used the values assigned to answer questions 14-18 to determine the amount of monetary value that Surface Warfare Officers place on homeport, billet, and ship type. We then built a model based on the survey results to place a dollar value on ship type, billet, and homeport. We included the quality of life question responses in our further research section of the project.

## **E. MOTIVATION**

Maintaining sufficient numbers of highly trained and highly motivated military officers across all branches of service remains of utmost importance to ensure the continued prosecution of the present Global War on Terrorism. Longer and more frequent deployments along with the steadily increasing death toll updates on the nightly news serve as grim reminders of how dangerous and difficult filling the ranks of military officers has become. In addition to the growing operations tempo, the services have had to battle with corporate America for the limited supply of talent available in the



workplace. A comment by Vice Admiral Ryan to the Senate Armed Services Subcommittee highlighted the growing challenges of competing with the commercial sector for the best and brightest:

Today's recruiting and retention atmosphere can be best described as war... a sustained engagement to recruit and retain the very best men and women this nation has to offer.<sup>2</sup>

The U.S. military is not alone in the fight to recruit and retain skilled personnel. One private-sector survey found that 65 percent of human resource executives listed recruitment, selection and placement among their top three priorities in 2000. A follow-on survey found that 72 percent of HR professionals were concerned about recruitment and retention. In highly technical fields, such as Information Technology and Engineering, companies are especially vulnerable to a limited pool of qualified employees. Some outside observers have even suggested that the military's recruitment and retention problems stem from its inability to compete with the pay and benefit offerings of private sector companies.<sup>3</sup>

The U.S. military can be thought of as a large employer not unlike those found in the private sector. It competes for talent externally with the private sector and also internally between each of the branches of service. In many ways it is subject to the same labor opportunities and constraints facing large private sector companies. The Navy's enlisted ranks, for example, are comparable in size to IBM's global workforce.<sup>4</sup> Both private and public institutions are facing the same struggle to recruit and retain high quality employees.

To recruit this new generation of college graduates, often referred to as "generation Y," many private-sector companies often shower them with large salaries, bonuses, and in many cases promises of a flexible work schedule and benefits that can be custom tailored to each prospective employee's needs. Companies such as Ernst &

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<sup>2</sup> CENTER FOR NAVAL ANALYSES ALEXANDRIA VA & Hattiangadi, 2001.

<sup>3</sup> CENTER FOR NAVAL ANALYSES ALEXANDRIA VA & Hattiangadi, 2001.

<sup>4</sup> CENTER FOR NAVAL ANALYSES ALEXANDRIA VA & Hattiangadi, 2001.

Young, for example, have adjusted their recruiting methods, using Facebook and Craigslist to actively engage this next generation workforce.<sup>5</sup> All this increased competition for a shrinking labor market coupled with the increasing danger and workloads imposed upon military officers has forced the military services to rethink the means by which they intend to recruit, train and reward future military officers. From past studies conducted by the Naval Postgraduate School, it is clear that this new generation of junior officers is looking for more than just financial incentives to recruit and retain them. They want the ability to choose between a variety of incentives both monetary and non-monetary. The Navy is only just now beginning to recognize this fact and is struggling to come up with solutions to adequately address the retention concerns at hand.

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<sup>5</sup> U.S. Navy 2007.

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## **II. LITERATURE REVIEW**

### **A. LITERATURE REVIEW**

The Department of Defense has experienced a period of significant downsizing service since the end of the Cold War era. Much of this force reduction occurred in the 1990's as the Administration tried to capitalize on the "peace dividend." This reduction in force included equipment as well as personnel, including both officers and enlisted. Without any significant consideration of future conflicts, the services reduced their capabilities across the board. Since September 11, 2001, however, there has been an increasing demand for personnel to fill the voids left behind in the all volunteer force. The commitments of the U.S. in Iraq, Afghanistan and other hot spots around the world have stretched the capabilities of the military services to their very limits. More than ever, maintaining the proper quantity and quality of military officers remains paramount to the nation's safety and security.

With the transition to an all volunteer military force in 1973, the military services have dedicated significant resources to recruit, train, and maintain the military force of the future. The decision of today's senior military leaders with regards to recruitment and retention will have a significant impact upon the future decisions of young college graduates to become military officers. The continuous availability of experienced, skilled and highly motivated military officers is paramount to maintaining the safety and security of the United States and its Allies. Without the sufficient quantity and quality of military officers, the United States faces the real possibility of not being able to meet the current as well as future needs of the Global War on Terror and any future conflicts that remain unseen as of yet.

#### **1. Officer Corps**

The officer corps of the military serves as the leaders of the all volunteer force. They are the ones ultimately responsible for recruiting, training and ensuring their personnel remain ready to go into harms way. Without military officers, the nation's

military forces would cease to exist.<sup>6</sup> Officers serve in the four primary branches of military service to include the Army, Navy, Air Force and Marines and are accessed from a variety of sources coming from a variety of backgrounds including; engineering, medicine, law, business and the sciences. The military services have traditionally used three primary programs to award commissions to future military officers. These programs include the military academies, Reserve Officer Training Corps (ROTC) and Officer Candidate/Training School (OCS/OTS).<sup>7</sup>

## **2. Officer Accession Sources**

The military academies include The U.S. Military Academy, U.S. Naval Academy and the U.S. Air Force Academy. Each offer four year undergraduate programs that provide Bachelor Degrees to all officer candidates upon completion, ensuring their commissioning as military officers in their selected service. In addition to a rigorous academic schedule, the officer candidates are subjected to intense military specific training as well as physical fitness training. Graduates of the service academies are required to serve on active duty for a period of five years after commissioning.<sup>8</sup>

The Navy's military academy, the U.S. Naval Academy, founded in 1845, is located in Annapolis Maryland. Students with a strong desire to attend are subject to a rigorous selection process with only approximately about 10% of applicants being accepted. In 2002, only 1214 of the 12,333 applicants were accepted for admission. Upon acceptance into the U.S. Naval Academy, students receive free tuition, room and board as well as books. Graduates from the Naval Academy can choose among 18 possible majors and upon graduation earn a commission in the U.S. Navy or Marine Corps.<sup>9</sup> The Naval Academy is the second largest source of Surface Warfare Officers (SWOs).<sup>10</sup>

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<sup>6</sup> Wahl & Singh, 2006.

<sup>7</sup> United States Government Accountability Office, 2007.

<sup>8</sup> Wahl & Singh, 2006.

<sup>9</sup> *USNA website.*

<sup>10</sup> Wahl & Singh, 2006.

Reserve Officer Training Corps (ROTC) – The military service ROTC units are located at civilian undergraduate institutions throughout the country. As of January 2007, the Army had ROTC units located at 273 academic institutions, the Navy at 71 institutions and the Air Force at 144 institutions.<sup>11</sup> Students who are awarded ROTC scholarships receive full tuition along with room and board. They receive the same academic instruction as their civilian classmates; however, they are also required to complete military specific training. Upon graduation, these officer candidates receive commissions which require them to commit to four years of active duty service.<sup>12</sup>

Navy ROTC – The Navy's Reserve Officer Training Corps was founded in 1926. To receive a NROTC scholarship, students must complete a rigorous application and interview process and achieve acceptable scores on the Scholastic Aptitude Test (SAT). Like other ROTC scholarship programs, the NROTC program provides students serving in ROTC, also known as midshipmen, with full tuition reimbursement for their selected college or university, along with a stipend for books, food and uniforms. Once an applicant is enrolled in the NROTC program, they are taught the basic principles of military bearing, leadership, drill and seamanship. These students are required to take courses in naval science each semester which cover a broad array of topics, to include: naval history, navigation, ethics and leadership. Upon successful completion of their university and NROTC requirements, these midshipmen graduate and are commissioned as Ensigns in the U.S. Navy. Once midshipmen accept their commissions, they are obligated to serve on military active duty for a period of four years and reserve military duty for an additional four years, for a total of eight years of service.<sup>13</sup> The Navy's ROTC program is the largest accession source for Surface Warfare Officers. In 2007 alone, the NROTC program provided 290 SWOs to the fleet.<sup>14</sup>

Officer Candidate Schools (OCS) and Officer Training Schools (OTS) are the third primary accession tool for the military services. These programs are primarily

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<sup>11</sup> United States Government Accountability Office, 2007.

<sup>12</sup> *Military.com ROTC website.*

<sup>13</sup> *NROTC-history.*

<sup>14</sup> Wahl & Singh, 2006.

aimed at college graduates who wish to obtain commissions in a selected branch of service. Typically these programs focus on basic military training and can range from as short as 6 weeks for the Marine Enlisted Commissioning Education Program to 14 weeks for the Army Officer Candidate School.<sup>15</sup> The services have traditionally relied more heavily upon the military service academies and the ROTC programs for new officer accessions. When these programs failed to meet their assigned quotas, however, the OCS/OTS programs have been used to make up for any shortfall in accession numbers. OCS provided 92 SWOs to the fleet in 2007.

The Navy's Officer Candidate School is located in Pensacola, Florida and provides 13 weeks of officer candidate indoctrination and training. Most of the applicants who attend OCS already hold a Bachelor's degree, typically in a Business or Science related field of study. The course of study while at OCS is intense and includes classes on the naval sciences; it is accompanied by arduous physical fitness and drill programs. Successful completion of OCS is rewarded with a commission as a naval officer for a required minimum period of 4 years active duty.

STA-21 - The Seaman to Admiral Program, now known widely as STA-21, was re-instated in 1994. The program was designed for enlisted navy men and women to earn commissions in the U.S. Navy and serve the balance of their careers as naval officers. To apply for the STA-21 program, applicants must already possess at least an Associates degree from an accredited college or university. Once an applicant is accepted into the program they attend OCS and, once completed, receive their commission as Naval Officers in the U.S. Navy. They must serve for a period of 4 years.<sup>16</sup> 109 SWOs were commissioned through the STA-21 program.<sup>17</sup>

LDO Program – The Limited Duty Officer program is an enlisted to officer program that the Navy uses to retain their most technically capable sailors. The program does not require a college degree. LDOs usually serve for a period of eight years as an

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<sup>15</sup> United States Government Accountability Office, 2007.

<sup>16</sup> *Seaman to admiral-21*.

<sup>17</sup> Chief of Naval Operations, Washington, DC Naval Message, Subject: SWO Continuation Pay, 181759Z OCT 99.

enlisted sailor and then serve out the remainder of their careers as commissioned officers, typically until they retire from active duty.<sup>18</sup>

### **3. Naval Surface Warfare Community**

Navy Surface Warfare – Surface Warfare is the Navy community that uses surface ships for the missions of forward naval presence, sea control and projection of power ashore. The Surface Warfare community is the oldest community in the Navy and today comprises just over 8,000 officers.<sup>19</sup> Surface Warfare Officers are those naval officers whose primary duties focus on the operation of surface ships at sea, including managing all the onboard systems and personnel. Surface Warfare Officers are the “ship drivers” of the fleet. It is their job to lead the ship into harms way when so directed by higher authority. The pinnacle of a Surface Warfare Officer’s career path would typically be to command a ship at sea. Those that aspire to such great heights of leadership must pass through a variety of challenging career milestones that serve to train and prepare them for such an enormous responsibility.

Like all other naval officers, the Surface Warfare Officer typically comes into the Navy with a four year college degree. Most of these junior Surface Warfare Officers go directly to sea after graduating from their undergraduate institutions, serving their first tour division officer job when they arrive. The primary goals of Surface Warfare division officers are to learn their jobs to the best of their ability and develop their leadership skills by being placed in charge of a particular shipboard division. The SWO division officer tours are designed to provide the hands on training and development necessary for the new officers entering the fleet. Division officer tours are typically 24 and 18 months for 1<sup>st</sup> and 2<sup>nd</sup> division officer tours, respectively. These two tours are typically split between different ship types. The first division officer tour lasts approximately 24 months and its primary goal is to have the Junior Surface Warfare Officers qualify in a variety of areas, most importantly becoming qualified as Officer of the Deck (OOD)

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<sup>18</sup> *LDO/CWO community.*

<sup>19</sup> Graham & Naval Postgraduate School, U.S., 2006.



underway and achieving sufficient expertise in their career field to become Surface Warfare Officer (SWO) qualified, enabling them to wear the Surface Warfare Officer breast insignia.



**Figure 1. Surface Warfare Officer Breast Insignia**

The “SWO pin,” created in 1975 is awarded to those SWOs who have shown the requisite knowledge and expertise in their fields. During this initial division officer sea tour, officers are typically assigned a variety of jobs within multiple shipboard departments. This variety provides the junior SWO with a highly diversified background from which they become familiar with all onboard systems and personnel. This broad background is key for junior officers in achieving their qualifications as Surface Warfare Officers. During this initial sea tour, junior officers must develop a familiarity with seamanship, leadership, and initial war fighting skills.<sup>20</sup> Completion of this first division officer tour afloat will be followed by a second tour afloat as a division officer but with increasing levels of leadership and responsibility required.

The typical second tour for the junior Surface Warfare Officers sees them being transferred to another ship platform or they can choose to “fleet up” on their current platform into a second tour division officer job. Either way, the second tour jobs will have the officers serve in positions different than those of their first tours. A second tour division officer job typically lasts about 18 months and will have junior officers serve in jobs requiring greater amounts of expertise and responsibility. Typical second tour jobs might include: Navigator, Training Officer, or Main Propulsion Assistant (MPA) depending on the type of platform on which they are serving. These second tour jobs allow the junior officers to obtain additional qualifications, such as Engineering Officer of the Watch (EOOW) and Tactical Action Officer (TAO). In addition, their in-port

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<sup>20</sup> Wahl & Singh, 2006.

responsibilities grow to include becoming Command Duty Officer (CDO) qualified and possibly Engineering Duty Officer (EDO) qualified. Overall, second tour division officer jobs, allow junior officers to specialize in a particular job specialty and provides them with a more diversified background.

Surface Warfare Officers have the chance to serve in a variety of locations around the world. Most of their first and second tour assignments however are in a major fleet concentration area, such as Norfolk, VA; San Diego, CA; Bremerton, WA; Mayport, FL; Pearl Harbor, HI; and Yokosuka, Japan. Upon successfully completing their two afloat division officer tours, they have the opportunity to rotate to shore duty and pursue a variety of interests, which may include pursuing a graduate degree, working in a staff position or working as a recruiter. This time ashore is designed to further broaden the experience of young SWOs as well as provide them additional education and training as they prepare to return to the fleet as Department Heads afloat.

Today, the Navy's primary concern with the Surface Warfare Officer community is how to continue to retain the necessary quality and quantity of officers past their initial obligations to ensure there are sufficient Surface Warfare Officers available to fill all the Department Head jobs that exists across the fleet. Typically, a junior SWO reaches the end of their initial obligated service period while on their second afloat division officer tour or at the latest on their first shore tour. Most of these officers must make critical career decisions on whether to stay in the navy or look for a career in the civilian sector. Many decide to get out of the navy at this point; others may try to make a lateral transfer to another community, while some decide to continue in their SWO career path.

During the past 10 years, the Navy has faced a shortage of Surface Warfare Officers at the Department Head Level. To increase the SWO retention rate into their Department Head Tours, the Navy implemented the Surface Warfare Officer Continuation Pay (SWOCP), a special pay designed to incentivize those personnel eligible to pursue their SWO careers as afloat Department Heads. Upon acceptance of the SWOCP, the officers must commit to completing department head school followed by two back to back 18 month department head tours afloat.

#### **4. History of SWOCP**

The Surface Warfare Officer Continuation Pay (SWOCP) was officially established in January 2000. Often referred to as the “SWO bonus,” it was designed primarily to keep all afloat department head billets filled by enticing junior officers who might otherwise have decided to leave the navy prior to their department head tours. In addition, it served to increase overall retention rates and reduce the overall costs of the SWO community by limiting the number of new SWO accessions required to make up for the shortfall at the SWO department head level.<sup>21</sup> Other communities within the Navy have traditionally received bonuses as well. These bonuses are also awarded to ensure the Navy retains the skilled manpower in critical career fields, such as doctors, dentists, aviators, flight officers and nuclear officers. In all, these bonuses serve the same overall purpose: to retain personnel with critical skills to serve past their initial obligations.<sup>22</sup>

The Surface Warfare Officer Continuation Pay became available upon the enactment of the FY-00 Department of Defense Appropriation Bill. SWOCP is an incentive pay, paying up to a total of \$50,000 for completion of two afloat department head tours. SWOCP contracts terminate at the completion of the two department head tours or one single long department head tour. SWOCP obligation runs concurrent with any other obligated service applicable to that officer, with the exception of the officer’s original commissioning source. The Chief of Naval Personnel has been delegated the authority to determine the eligibility of applicants, accept SWOCP contracts, and manage the SWOCP program.

#### **5. Eligibility Requirements**

To be eligible for the Surface Warfare Officer Continuation Pay (SWOCP), officers must meet the following criteria:

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<sup>21</sup> Naval Postgraduate School Monterey, CA 2006.

<sup>22</sup> Chief of Naval Operations, Washington, DC Naval Message, Subject: SWO Continuation Pay, 181759Z OCT 99.

- Have earned their Surface Warfare Officer qualification or be currently serving as a designated Surface Warfare Officer. Surface Warfare officer designations are 1165, 1115, and 1110.
- Been recommended for and screened for department head tours by a PERS-41 screening board.
- Complete all obligated service commitment incurred through the officer's original commissioning source.
- Maintain the ability to complete two department head tours or one single long department head tour as assigned by PERS-41.
- Apply to receive SWOCP prior to graduation from department head school.

Officers who are in the Naval Reserve but serving on active duty who meet the criteria are also eligible to apply for SWOCP. Officers who have submitted resignation letters must withdraw their resignation request prior to being considered for SWOCP. Officers who are receiving SWOCP may not lateral transfer to another community until completion of the Department Head minimum tour length requirement; however, they may apply and be accepted for lateral transfer without penalty.

## **6. Payment Scheme**

Once the SWOCP contract has been approved by PERS-41, officers are eligible to receive their first 10,000 dollar installment upon contract acceptance. At the onset of DH school or start of their first department head tour, officers will receive their second 10,000 dollar installment. The remaining three installments will be paid on the anniversary date of their department head school report date.

## **7. Recoupment**

If an officer fails to maintain eligibility for SWOCP, fails to complete the required tour length or obligated service, then no further SWOCP payments will be made. The situations which require bonus recoupment are listed below:

- Approved request for voluntary release from written agreement, due to unusual circumstances. Navy Personnel Command will determine if it is in the best interest of both parties to grant such a release.
- Approved voluntary request for relief.

- Refusal to accept orders to a department head billet.
- Disability resulting from misconduct, willful neglect, or incurred during a period of unauthorized absence.
- Separation for cause, including misconduct.
- Approved detachment for cause.
- Failure to complete department head school.
- Separation by reason of weight control or physical readiness test failure.

In the following situations, no further payments will be made but past payments will not be recouped:

- Disability not as a result of misconduct, willful neglect, or not incurred during a period of unauthorized absence.
- Separation from Naval service by operations of laws or regulations independent of misconduct.
- Navy Personnel Command deems the waiver of payments is in the best interests of the United States.

If an officer under a SWOCP contract dies prior to receiving the full bonus due, the remaining unpaid balance is payable as a lump sum for inclusion in settlement of deceased officer's final military pay account.

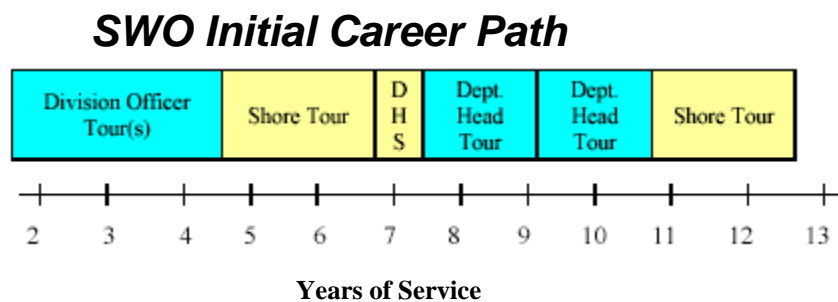
#### **8. Junior Surface Warfare Officer Critical Skills Retention Bonus (JR SWO CSRB)**

The Junior Surface Officer Critical Skills Retention Bonus was designed to compensate sailors for completing highly demanding jobs and in an effort to improve retention amongst Surface Warfare Officers. The Navy faced competition from the civilian sector and job placement agencies such as Lucas group. The bonus is a career incentive, and pays eligible lieutenants 25,000 dollars to stay in the Navy and Surface Warfare Community through the ninth year of commissioned service and completion of two department head tours. To qualify for the JR SWO CSRB officers must have an approved SWOCP contract on file. <sup>23</sup> JR SWO CSRB and SWOCP are paid from separate budgetary accounts.

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<sup>23</sup> Chief of Naval Operations, Washington, DC Naval Message, Subject: Junior Surface Warfare Officer Critical Skills Retention Bonus.

Past research has uncovered a variety of reasons for low retention rates in the Surface Warfare Officer community. Part of the ongoing retention problem arises from the challenges associated with the overall SWO career path. A large portion of a SWOs career involves extended time at sea, either conducting training exercises or deploying to hot spots overseas. Typically, most of this sea time occurs at the beginning of their careers from their initial tours as division officers through their Department Head Tours. Sea time during this period can include up to seven years.<sup>24</sup> The figure below delineates the typical SWO career path through their Department Head tours.



**Figure 2. SWO Initial Career Path (From RAND)**

As noted by several retention studies in recent years, this extended time at sea has become a key factor for officers who decide to leave the Navy after completing their initial obligation. This single factor alone, however, does not adequately capture the majority of reasons why SWOs decide to leave their jobs.

In 2006, research conducted by Sharon Graham at the Naval Postgraduate School identified a multitude of reasons why SWOs were leaving their jobs in such large numbers. Some of the reasons given by the participants (both male and female) in her survey included; lack of confidence in senior leadership, lack of passion for the job, inability to achieve a proper work/life balance and excessive work hours. For the female survey participants, family planning was a crucial factor in their decisions to leave the SWO community. In many cases, as Graham's thesis noted, the SWOCP alone was insufficient to retain many of these highly qualified officers in their communities. Even with the SWOCP, many still sought to make lateral transfers while others opted to

<sup>24</sup> RAND NATIONAL DEFENSE RESEARCH INST SANTA MONICA CA, Yardley, Thie, Brancato, & Abbott, 2004.

terminate their navy careers altogether. Graham conducted interviews, which showed very clearly that the SWOCP alone was not going to solve the SWO Department Head retention issues that the Navy currently faces. Many of Graham's survey participants commented loud and clear on how money was not the primary motivator for their continued service as a SWO. One survey participant was quoted as saying:

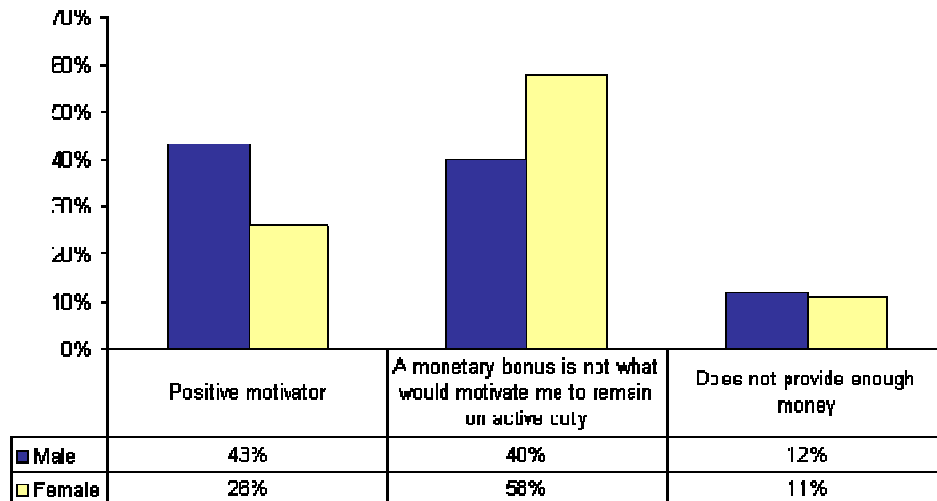
They could take SWOCP and double it. It wouldn't keep me around. It's not the money. It's the job satisfaction. (male SWO)<sup>25</sup>

This theme has been echoed time and time again in a variety of studies, including those conducted at the University of San Diego by Wahl and Singh.<sup>26</sup> In their study, they found that job satisfaction, retirement benefits and educational opportunities were most important to their survey participants. Of the 14 statements provided in their survey, the influence of the SWOCP ranked between fifth and eighth. Each of the studies conducted above has continued to reemphasize the fact that people are motivated at a variety of levels and by a variety of incentives based on their unique individual needs and desires. The Chief of Naval Personnel (CNP) Quick Poll in 2004 recorded these same findings when asking about SWOCP's influence on retaining SWOs.

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<sup>25</sup> Graham & Naval Postgraduate School U.S., 2006.

<sup>26</sup> Wahl & Singh, 2006.

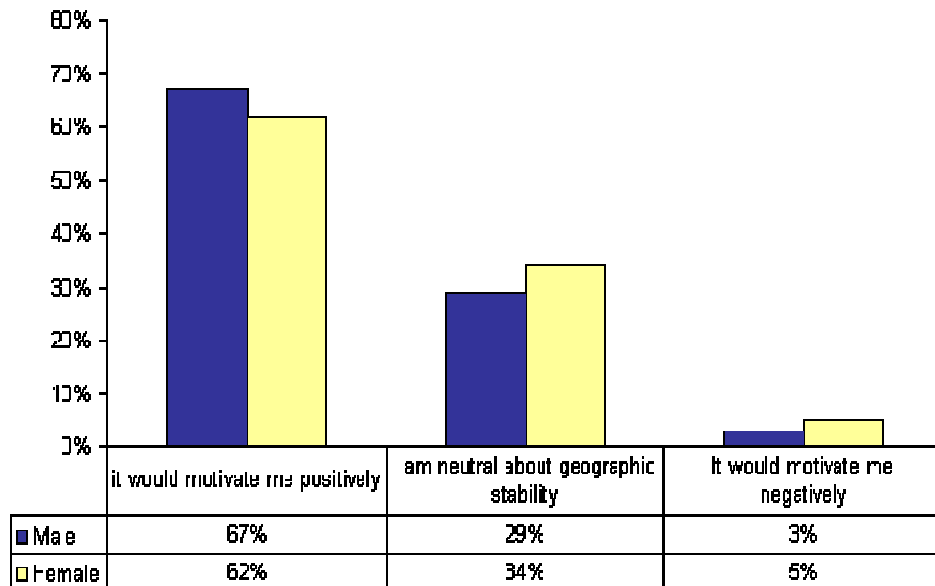


**Figure 3. SWOCP as a SWO motivator (From 2004 CNP Quick Poll)**

When asked about the impact of SWOCP as a motivator, results were split across gender lines with only 26% of females believing SWOCP was a positive motivator compared to 43% of their male counterparts. Even more telling is the response to how effective a monetary bonus is in motivating a SWO to remain on active duty. Forty percent of the Male SWOs said that a monetary bonus is no motivator at all, while this number ballooned up to 60% for SWO females.

The same quick poll examined the possible use of geographic stability as a motivator to retention. The results indicated that more than half of the SWOs surveyed indicated that it was, with 67% of the males favoring geographic stability as a positive motivator compared to 62% for their female counterparts.





**Figure 4. Geographic Stability as a SWO Motivator (From 2004 CNP Quick Poll)**

The challenge for the Navy remains to adapt to the desires of the next generation workforce or face what will become a huge “brain drain” of talent out of naval service.

The Graham study uncovered some possible future incentives, both monetary and non-monetary, that the Navy may choose to adopt if it is serious about closing the retention gap in the Surface Warfare Community. In addition to the SWOCP, other incentives identified through Graham’s interviews included the possibility of taking a sabbatical/leave of absence from the job, the guarantee of a lateral transfer, allowing career flexibility, geographic stability and guaranteed graduate education.

This project will examine the possibility of implementing an officer driven choice based incentive package whereby officers can choose among a variety of incentives, to include SWOCP, choice of homeport, choice of billet, and choice of ship platform.

### III. SURVEY RESULTS

#### A. RESPONSE RATES

In trying to determine survey response rates, the authors were unable to identify the exact numbers of officers in each of the sample sizes. The response rate is the proportion of all people who were selected who completed the survey.<sup>27</sup> For NPS SWO students, we were not able to identify how many lateral transfers from the SWO community were in attendance at NPS. Some may or may not have received the survey. For our survey to the junior shipboard SWOs, we were unable to determine just how many officers were onboard each ship that fit our eligibility criteria for survey completion (O-3 and below who have not yet signed on for SWOCP). Due to known correlation between ship type and wardroom size, we estimated what our approximate sample size would be in order to calculate a response rate.

<b>Survey Group</b>	<b>Sample Size (Approximate)</b>	<b>Number of Responses (Actual)</b>	<b>Overall Response Rate (Approximate)</b>
NPS SWO Students	180	53	29 %
Junior SWOs afloat	1200	260	22 %
<b>Totals</b>	<b><u>1380</u></b>	<b><u>313</u></b>	<b><u>23%</u></b>

**Table 3. NPS and Fleet Survey Results Total**

The Central Limit Theorem states that for any sample size where  $n \geq 30$ , where  $n$  represents the sample size of the population in question, we can accurately use our findings to make predictions about the population.<sup>28</sup> In this project, because we have sample sizes equal to or greater than 30 in both instances, with NPS students totaling 53

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<sup>27</sup> Keller, Gerald 2005.

<sup>28</sup> Keller, Gerald 2005.

and SWOs afloat totaling 260, then in both cases we are able to make statistically acceptable predictions about the population.

The junior officer afloat survey was emailed to 110 Commodores, Commanding Officers, and Executive Officers onboard ships worldwide on 13 August 2007. By 27 August 2007, the cutoff date for tabulating results, 319 responses were received. No reminder notice was placed on the survey. The Commanding Officers of USS Port Royal, USS Ford, USS The Sullivans, and USS Germantown personally responded to the authors regarding the distribution of the survey to their junior officers. This was very significant for the reliability of the survey. All respondent identification codes, internet protocol (IP) addresses, and privacy act data was eliminated from the fleet responses to prevent comprising a respondent's identity. The target audience of the fleet survey indicated via email was lieutenants (O3) and below who had not yet accepted the SWOCP bonus and occupy the billets listed in the chart below.

PLATFORM	DESIGNATED 2ND TOUR BILLETS
APSLANT	TLAM PLANNER
APSPAC	TLAM PLANNER
AS	NAV
CDS	STAFF
CG52-73	NAV, DCA, FCO, MPA, TRNG
CPG	PHIB OPS
CPR	STAFF
CV63	DIV WEPS, 1LT(3), FCO, AUX(2), BOILER GEN, SHIP ELEC (2), ADCA
CV67	NTDS-CIC (2), 1LT (2), DIV WEPS, SHP ELC, ADCA, AUX MACH
CVN65	DIV WEPS**, SHP ELX MTL, FCO, NTDS-CIC, CMS, 1LT
CVN68	DIV WEPS, 1LT(3), E DIVO, AUX
CVN69	NTDS-CIC, 1LT, DIV WEPS, E DIVO, AUX
CVN70	NTDS-CIC, 1LT, DIV WEPS, E DIVO, AUX
CVN71-77	NTDS-CIC, 1LT, E DIVO, AUX
DDG51	NAV, DCA, FCO, TRNG
ESG	STAFF (2)

EXPEDRIVRON	COAST/HARBOR DEFENSE
FFG	NAV, DCA, AUX, TRNG
HSV	OPS
IBU	XO, FPO
LCC	ACICO
LHA	WEP, AUX
LHD	FCO, AUX, WEPS
LPD	CICO, NAV, TRNG, R-DIVO
LSD41	NAV, TRNG, MPA, CICO
MCM	OPS
MCMDIV (Japan and Bahrain)	OPS, READINESS
MCMRON	OPS, READINESS-SKEDS, FPO
MEF	NGLO
MHC	OPS
MIUW	COAST/HARBOR DEFENSE, STF MTL
MSC APSRON	FPO, OPS
MSF DET	OPS
NAV BCH GRU	STF REDI PHIB
PC	OPS, WEPS
XCRAFT	OPS
**	DIV WEPS: CVN 65/68/69/70

**Table 4. Second Tour Div Officer Billets (From the PERS 412 website)**

The survey consisted of 18 questions and is attached as Appendix D. Most of the questions were multiple choice questions, with several open ended questions to gauge junior officer opinion of the current incentives and the possibility of new incentives that the Surface Warfare Officer community may offer to improve retention. The open ended questions were intended to give the Junior Officers (JO) an opportunity to express their opinions, suggestions, and concerns. The response rate for each question is listed in Appendix E.

There was a very negative tone to the survey responses. The open ended responses spoke very negatively of the Surface Warfare Officer Community and seemed to be emotionally driven. These answers more importantly indicated that junior officers feel the community has significant problems in addition to retention problems.

There was a limited amount of positive responses concerning SWOCP. However the positive responses indicated junior officers enjoy port visits, leading sailors, and the current SWOCP incentive. The top five satisfiers for the Surface Warfare Community are listed below with a quote from an anonymous survey respondent in each case:

- Graduate Education

Additional or improved educational opportunities would be worth forfeiting some amount of the bonus (dependant upon the nature and incentive of the educational program)

- Housing

Guaranteed Base Housing - 5000 Money for dependents education – 10000

- Leave Sabbatical

2 year sabbatical so you can earn a Masters Degree using your own money (10000).

- Geographical Stability

Just because I am not putting a dollar amount on these items doesn't make them any less meaningful. A guaranteed homeport, billet and ship type would be a great trade on a bonus all together. A parking spot would be great, an increase in OHA/BAH would be great, geographical stability would be fantastic.

- Telecommuting

The telecommuting idea is huge. This is the way (as I am sure you know) that the corporate world is heading and I think the Navy should follow as much as possible. Many of the officers in our wardroom have been talking this over and we all agree that it would certainly improve our QOL and make it easier to agree to stay on. We have even been discussing the fact that we would agree to lower salaries in exchange for working from home when not deployed. I think telecommuting is the most exciting idea I have heard WRT the SWO community, and it would probably sway me to agree to do two DH rides.

The negative responses indicated that junior officers were unsatisfied with senior leadership, family separation, working hours, and work load. The most troubling results of the survey indicate that junior officers feel if they take a sabbatical, have children, or lack operational experience then they will fall behind their peers and not get selected for promotion. Female officers highlighted the inability to get married and have children while being a Surface Warfare Officer. The survey also revealed that the SWOCP bonus, may not be enough for the Surface Warfare Officer community to continue to reach its goal of 275 department heads annually. The top five dissatisfiers for the Surface Warfare Community are listed below along with a quote from one of the survey respondents:

- Family Separation

A limit on the amount of time a ship can spend out to sea in a given calendar year - this alone would overshadow any offers of sabbatical or geographical stability. Right now I see it as simply impossible to have a 'normal' family life in which I have an active role in my children's' lives when I spend the majority of the 365 day year away from them. A sabbatical would be great, but once it is over, then I would be back to again rarely seeing my family. I have seen too many family problems develop as a direct result of service member's large amount of time spent on the ship instead of with their children or spouse. I know the Navy is not going to decrease underway time any time soon, and this is my reason for getting out of the Navy after my 4 year commitment is over.

- Workload

I would not give up any amount of money because I see what the department heads go through and no matter where you are at or what you are doing, the job is going to stink. You are going to be putting in super long hours and never get anything done. Why would I want any other incentives, it won't make it any better, since you are going to spend all your time on the ship anyway. You might as well let your family stay at your previous duty station, you are not going to get to see them anyway. Until being a department head is viewed as an achievement, you are going to always have problems getting Junior Officers to stay in. From our point of view right now, the Navy is so desperate to keep Department Heads that officers who really shouldn't be department heads are becoming department heads and just making it worse for the departments, officers, and sailors they attempt to lead. I don't know how many times in my career that I have been told that a family wasn't issued to me in my sea bag. Until this mentality changes the Navy will not be a career for me anymore. My family is way too important.

- **Micromanagement**

I would be more than happy to continue in the Navy if I could come home to my family every night, and if I had bosses that were reasonable people that talked to their subordinates like humans and not machines. - I would give up the entire bonus for this.

- **Poor Command Climate**

No amount of money would convince me to stay in the Navy. My decision to leave is based on the disappointment I have developed with the organization. We do not take care of our people. We do not train ourselves appropriately. We are too focused on quantity and not quality. Given I have a master degree in engineering, there is not much that the Navy can offer me. I joined the organization because I thought it was committed to more. I want to be part of something “bigger” that myself and something I could be proud off. I did not join the military for the money. Seeing as the Navy is not offering true honor courage and commitment, I do to feel that I am being true to myself by remaining part of an organization that I do not believe.

- **Individual Augmentation Billet (IA)**

One major incentive that does not have a monetary amount is to make IA's a sea tour billet.

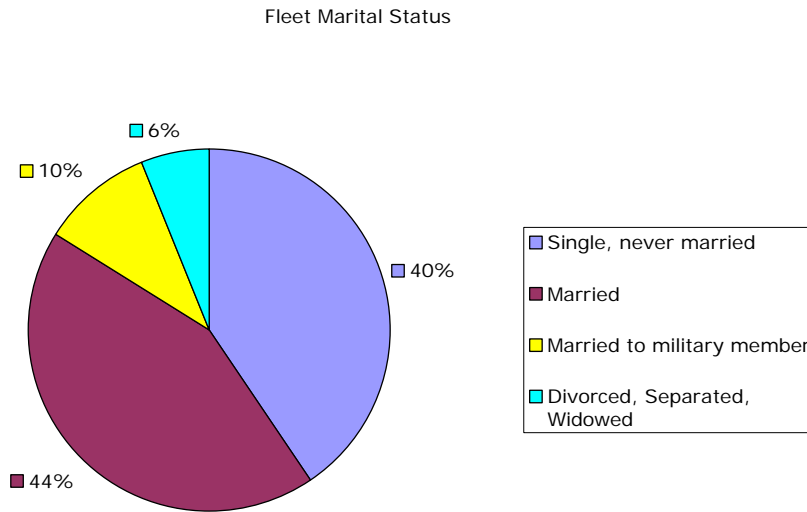
The survey contained questions concerning the current SWOCP bonus and the possibility of having the ability to decide your homeport, billet, and ship type. The responses indicated that SWOCP is a determining factor in retention, but more junior officers would like the opportunity to choose their homeport, billet, and ship type vice being slated by the detailer. Junior Officers did not necessarily indicate that they would take less money to have a definite homeport, billet, and ship type of their choice. There were no significant differences between Atlantic and Pacific coast respondents.

## **1. Fleet Survey Results**

### **Question #1: I agree to participate in this survey?**

All participants agreed to participate in the survey.

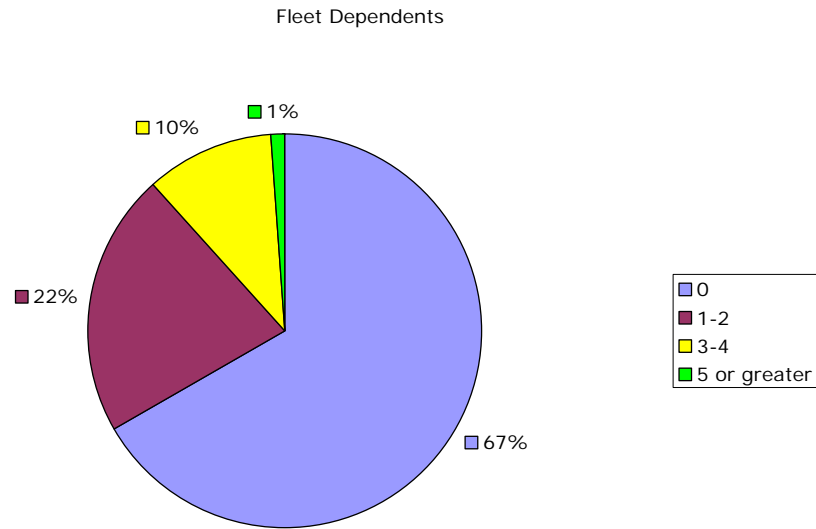
### **Question #2: What is your current marital status?**



**Figure 5. Fleet Marital Status. 44% of the fleet Surface Warfare Officers were married, 40% were single, 10% were married to other military members, 6% were divorced.**

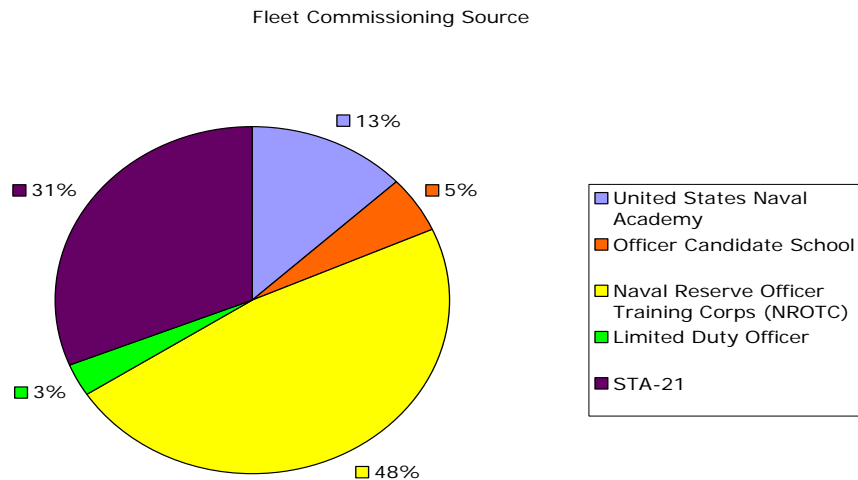


**Question #3: How many dependents (not including your spouse) do you have?**



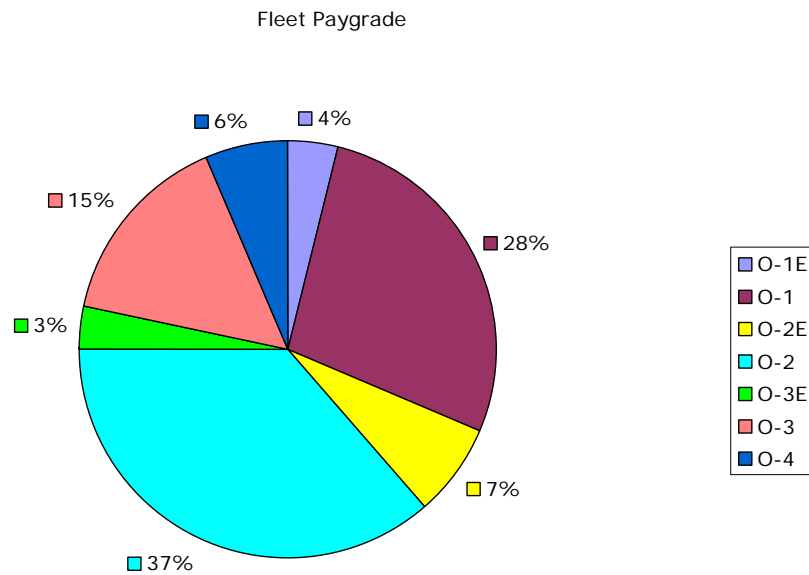
**Figure 6.** Survey revealed that 67% of fleet dependents have 0 dependents, 22% have 1-2 dependents, 10% have 3-4 dependents, and 1% have 5 or more dependents.

**Question #4: What was your commissioning source?**



**Figure 7.** Fleet Commissioning Source. 48% were commissioned through the NROTC program, 31% were commissioned via the STA-21 program, 13% were commissioned via USNA, 5% were commissioned via OCS, and 3% were commissioned via the LDO program.

**Question #5: What is your current paygrade?**

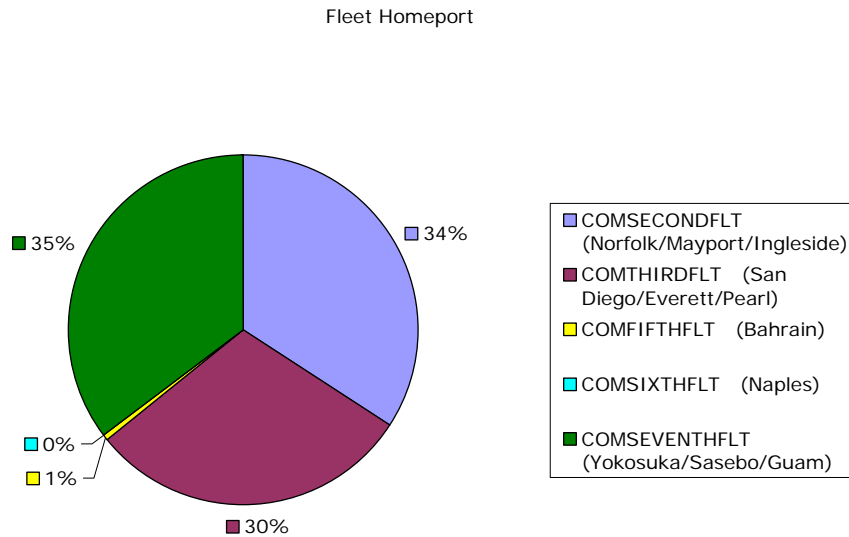


**Figure 8. Current paygrade of fleet Surface Warfare Officers. 37% of respondents were O-2, 28% were O-1, 15% were O-3, 7% were O-2E, 6% were O-4, and 4% were O-1E.**

**Question #6: Where are you currently serving?**

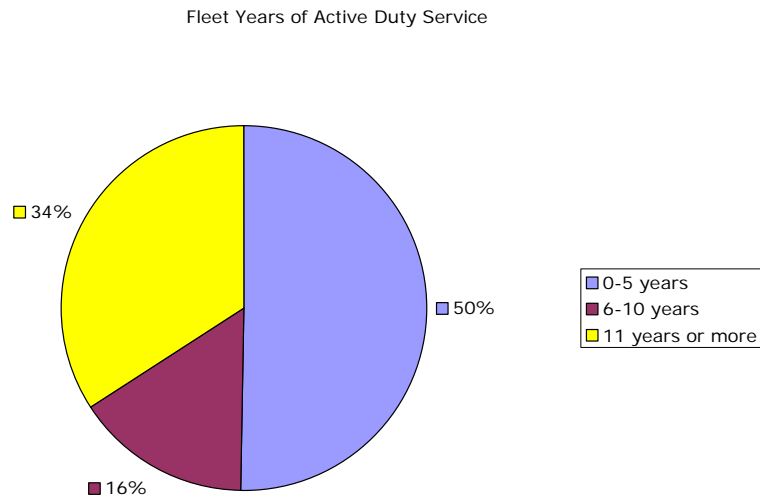
All participants are currently serving onboard ships throughout the Navy.

**Question #7: In which fleet is your homeport?**



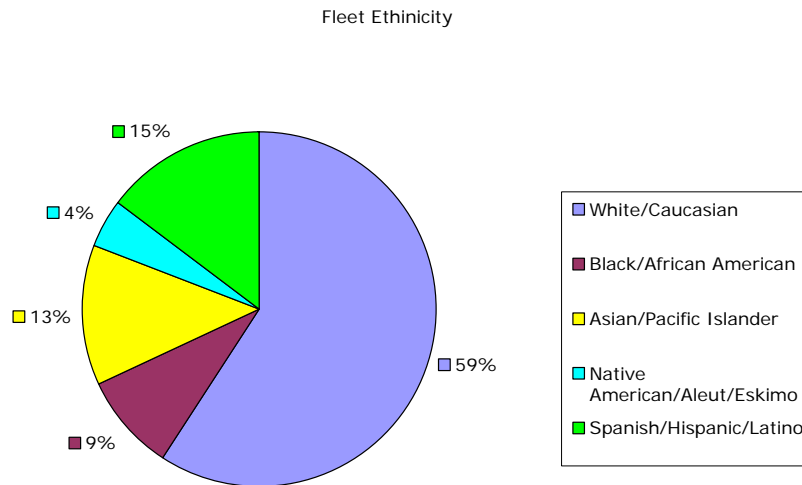
**Figure 9. Survey response by fleet homeport. 35% of responses were received from the COMSEVENTHFLT AOR, 34% were received from COMSECONDFLT, 30% were received from COMTHIRDFLT and 1% from COMFIFTHFLT.**

**Question #8: How many years of active duty service have you completed?**



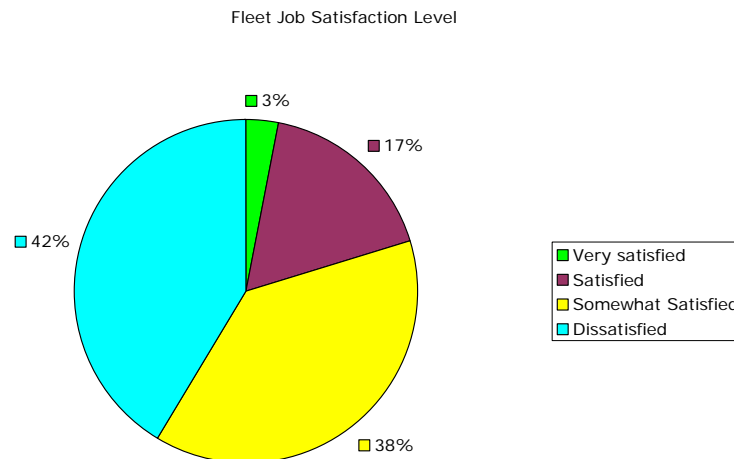
**Figure 10. Average number of years of active duty service of fleet Surface Warfare Officers. 50% have 0-5 years of service, 34% have 11 years or more of service, and 16% have 6-10 years.**

**Question #9: What is your ethnic descent?**



**Figure 11. Fleet Ethnicity results. 59% of fleet Surface Warfare Officers are Caucasian, 15% are Spanish, 13% Asian, 9% African American, and 4% Native American.**

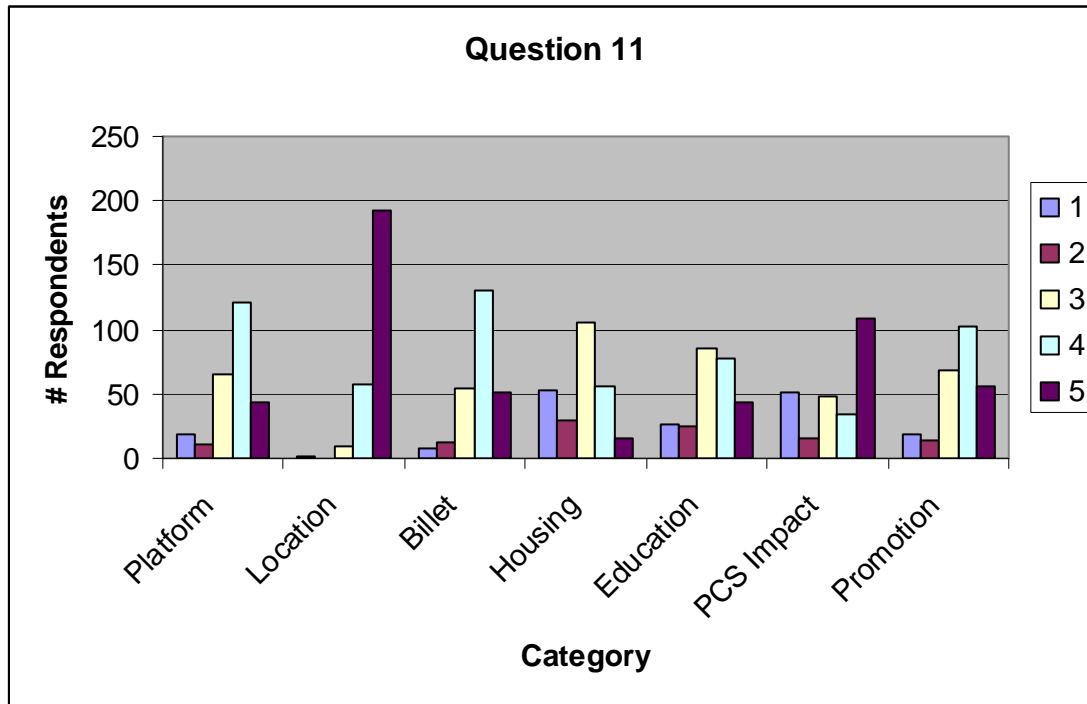
**Question #10: How would you describe your current level of job satisfaction?**



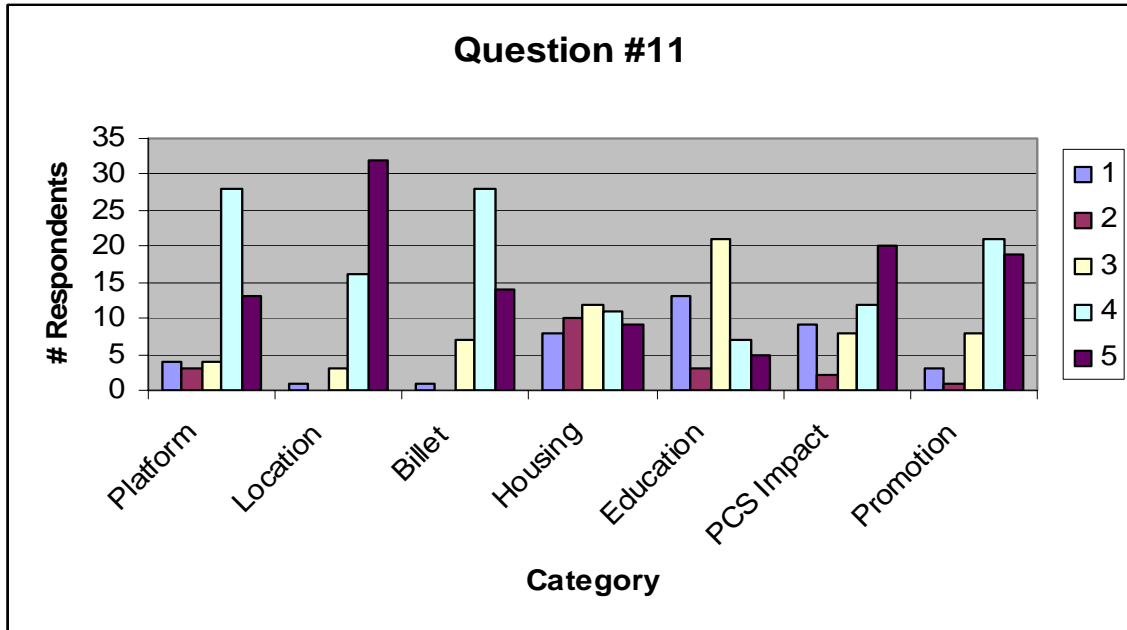
**Figure 12. Current fleet job satisfaction level. Research indicated that 42% of fleet Surface Warfare Officers are dissatisfied with their job, 38% are somewhat satisfied, 17% were satisfied, and 3% were very satisfied.**

**Question #11: Rank the following factors below in order of importance when deciding on permanent change of station orders.**

- Ship Type
- Location (Homeport)
- Billet
- Housing Availability
- Education Opportunities
- Impact of PCS moves on family
- Promotion/Professional Opportunities

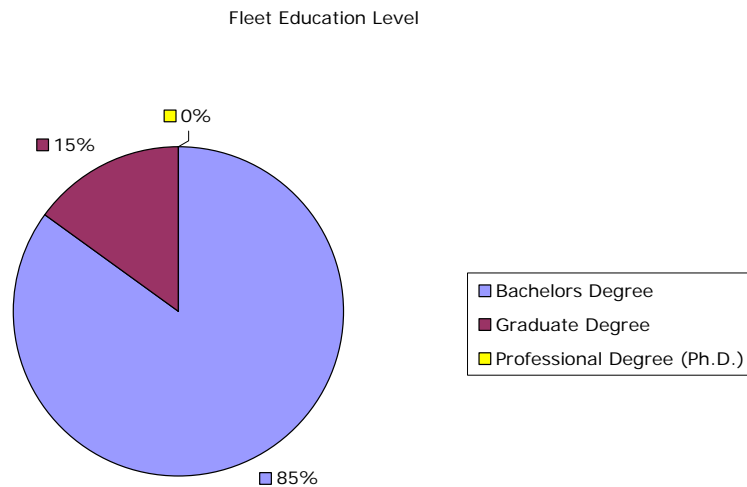


**Figure 13. Ranking of Key SWO Retention Issues. 1=Not Important; 2=Not Important/Neutral; 3=Neutral; 4=Important; 5=Very important**



**Figure 14. NPS Ranking of Key SWO Retention Issues. 1=Not Important; 2=Not Important/Neutral Important/Neutral; 3=Neutral; 4=Important; 5=Very important**

**Question #12: What is the highest level of education you have completed?**



**Figure 15. Current education level of fleet Surface Warfare Officers. 85% of the fleet Surface Warfare Officers have a bachelor's degree. 15% of fleet Surface Warfare Officers have graduate level education.**

**Question #13: What was/will be your primary reason for accepting or declining the Surface Warfare Officer Bonus?**

Results are located in Survey Monkey. Please use the following link to access answers to question 13.  
[http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA\\_3d\\_3d](http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA_3d_3d)

**Question #14: How much money in dollars would you require to commit to two Department Head tours. If there is no amount of money that would persuade you to commit to two Department Head tours, please enter “none.”**

105 Respondents answered “none” to this question. For those that did respond with a specific dollar value, the results have been summarized in the below table.

<i>SWO Bonus Fleet Response</i>	
Mean	117,135.92
Standard Error	4,612.12
Median	100,000.00
Mode	100,000.00
Standard Deviation	46,807.92
Sample Variance	2,190,981,343.99
Kurtosis	-0.08
Skewness	0.03
Range	200,000.00
Minimum	0.00
Maximum	200,000.00
Sum	12,065,000.00
Count	103.00

**Table 5. SWOs Afloat Bonus Statistics**

**NPS Students Bonus Statistics**

Three NPS Students entered “none” while those that entered specific dollar amounts have been summarized in the table below.

<i>SWO Bonus Amount</i>	
Mean	76,870
Standard Error	7,084
Median	75,000
Mode	100,000
Standard Deviation	48,044
Sample Variance	2,308,204,831
Kurtosis	9.621005343
Skewness	1.946508169
Range	300,000
Minimum	0
Maximum	300,000
Sum	3,536,000
Count	46

**Table 6. NPS Student SWO Bonus Amounts**

**Question #15: Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up, if guaranteed the following:**

- **Homeport**
- **Ship Type**
- **Billet.**

<i>Homeport</i>		<i>Ship Type</i>		<i>Billet</i>	
Mean	12,025	Mean	3,543	Mean	6,528
Standard Error	2,764	Standard Error	713	Standard Error	1,382
Median	1	Median	0	Median	0
Mode	0	Mode	0	Mode	0
Standard Deviation	40,715	Standard Deviation	10,473	Standard Deviation	20,353
Sample Variance	1,657,728,782	Sample Variance	109,690,606	Sample Variance	414,237,765
Kurtosis	101.1041132	Kurtosis	39.43621048	Kurtosis	78.52286284
Skewness	9.158551321	Skewness	5.564560572	Skewness	7.709919698
Range	500,000	Range	100,000	Range	237,000
Minimum	0	Minimum	0	Minimum	0
Maximum	500,000	Maximum	100,000	Maximum	237,000
Sum	2,609,538	Sum	765392	Sum	1,416,490
Count	217	Count	216	Count	217

**Table 7. SWOs Afloat Homeport, Ship Type and Billet Dollar Values**



<i>Homeport</i>		<i>Ship Type</i>		<i>Billet</i>	
Mean	6,432	Mean	3,137	Mean	3,157
Standard Error	1,572	Standard Error	883	Standard Error	824
Median	500	Median	0	Median	0
Mode	0	Mode	0	Mode	0
Standard Deviation	11,230	Standard Deviation	6,309	Standard Deviation	5,888
Sample Variance	1.26E+08	Sample Variance	39,800,659	Sample Variance	34,663,641
Kurtosis	7.576954	Kurtosis	6.743273	Kurtosis	6.038867
Skewness	2.627879	Skewness	2.622656	Skewness	2.398075
Range	50,000	Range	25,000	Range	25,000
Minimum	0	Minimum	0	Minimum	0
Maximum	50,000	Maximum	25,000	Maximum	25,000
Sum	328,025	Sum	160,001	Sum	161,010
Count	51	Count	51	Count	51

**Table 8. NPS Student Homeport, Ship Type and Billet Dollar Values**

**Question #16: Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up, if guaranteed the following:**

- **Homeport and Billet**
- **Homeport and Ship Type**
- **Ship Type and Billet**
- **Homeport, Billet and Ship Type**

<i>Homeport and Billet</i>		<i>Homeport and Ship</i>	
Mean	17,453	Mean	13,917
Standard Error	3,962	Standard Error	2,819
Median	750	Median	500
Mode	0	Mode	0
Standard Deviation	58,233	Standard Deviation	41,333
Sample Variance	3,391,140,774	Sample Variance	1,708,450,923
Kurtosis	111.6783646	Kurtosis	93.00922443
Skewness	9.613120261	Skewness	8.631033014
Range	737,000	Range	500,000
Minimum	0	Minimum	0
Maximum	737,000	Maximum	500,000
Sum	3,769,801	Sum	2,992,093
Count	216	Count	215

**Table 9. Fleet Homeport and Billet and Homeport and Ship Dollar Values**

<i>Homeport &amp; Billet</i>		<i>Homeport &amp; Ship Type</i>	
Mean	7,648	Mean	7,392
Standard Error	1,628	Standard Error	1,682
Median	2,000	Median	2
Mode	0	Mode	0
Standard Deviation	11,632	Standard Deviation	12,010
Sample Variance	135,307,484	Sample Variance	144,242,650
Kurtosis	5.351564488	Kurtosis	4.926939771
Skewness	2.199687082	Skewness	2.216458165
Range	50,000	Range	50,000
Minimum	0	Minimum	0
Maximum	50,000	Maximum	50,000
Sum	390,052	Sum	377,003
Count	51	Count	51

<i>Ship Type &amp; Billet</i>		<i>Homeport, Billet &amp; Ship Type</i>	
Mean	4,598	Mean	12,432
Standard Error	1,072	Standard Error	2,243
Median	0	Median	8,000
Mode	0	Mode	0
Standard Deviation	7,656	Standard Deviation	16,017
Sample Variance	58,609,093	Sample Variance	256,542,701
Kurtosis	3.224834301	Kurtosis	0.825812773
Skewness	1.94728971	Skewness	1.380709761
Range	30,000	Range	50,000
Minimum	0	Minimum	0
Maximum	30,000	Maximum	50,000
Sum	234,506	Sum	634,057
Count	51	Count	51

**Table 10. NPS Student Homeport and Billet; Homeport and Ship Type; Ship Type and Billet; and Homeport, Billet and Ship Type Dollar Values**

<i>Ship Type and Billet</i>		<i>Homeport, Billet, and Ship Type</i>	
Mean	8,254	Mean	23,064
Standard Error	1,677	Standard Error	4,159
Median	1	Median	4,000
Mode	0	Mode	0
Standard Deviation	24,572	Standard Deviation	61,267
Sample Variance	603,771,809	Sample Variance	3,753,639,375
Kurtosis	52.79904178	Kurtosis	88.06677766
Skewness	6.617223452	Skewness	8.24428897

<i>Ship Type and Billet</i>		<i>Homeport, Billet, and Ship Type</i>	
Range	237,000	Range	737,000
Minimum	0	Minimum	0
Maximum	237,000	Maximum	737,000
Sum	1,766,303	Sum	5,004,865
Count	214	Count	217

**Table 11. SWOs Afloat Homeport and Billet; Homeport and Ship; Ship Type and Billet; and Homeport, Billet and Ship Type Dollar Values**

**Question #17: Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up if guaranteed the following: a one year sabbatical, telecommuting or geographical stability. (Sabbatical is defined as an unpaid year to spend as you wish while retaining benefits. Telecommuting would allow you to work from home on scheduled days. Geographic stability allows personnel to serve three consecutive years in the same geographical region.)**

- **One Year Sabbatical**
- **Telecommuting**
- **Geographic Stability**

<i>One Year Sabbatical</i>		<i>Telecommuting</i>		<i>Geographical Stability</i>	
Mean	15,293	Mean	20,300	Mean	16,220
Standard Error	3,213	Standard Error	5,660	Standard Error	3,439
Median	0	Median	1	Median	1
Mode	0	Mode	0	Mode	0
Standard Deviation	46,888	Standard Deviation	83,189	Standard Deviation	50,424
Sample Variance	2,198,497,949	Sample Variance	6,920,411,378	Sample Variance	2,542,559,016
Kurtosis	60.77912439	Kurtosis	96.61847584	Kurtosis	56.53815081
Skewness	6.900125226	Skewness	9.124162688	Skewness	6.937002327
Range	500,000	Range	1,000,000	Range	500,000
Minimum	0	Minimum	0	Minimum	0
Maximum	500,000	Maximum	1,000,000	Maximum	500,000
Sum	32,57,357	Sum	4,384,894	Sum	3,487,343
Count	213	Count	216	Count	215

**Table 12. SWOs Afloat Sabbatical, Telecommuting, and Geographic Stability Dollar Values**

<i>Sabbatical</i>		<i>Telecommuting</i>		<i>Geographical Stability</i>	
Mean	4,628	Mean	2,550	Mean	5,314
Standard Error	1,499	Standard Error	885	Standard Error	1,720
Median	0	Median	0	Median	0
Mode	0	Mode	0	Mode	0
Standard Deviation	10,708	Standard Deviation	6,322	Standard Deviation	12,283
Sample Variance	114,668,855	Sample Variance	39,967,398	Sample Variance	150,878,819
Kurtosis	6.195949361	Kurtosis	16.2055006	Kurtosis	20.9113463
Skewness	2.49131608	Skewness	3.810007839	Skewness	4.130113379
Range	50,000	Range	35,000	Range	75,000
Minimum	0	Minimum	0	Minimum	0
Maximum	50,000	Maximum	35,000	Maximum	75,000
Sum	236,052	Sum	130,051	Sum	271,051
Count	51	Count	51	Count	51

**Table 13. NPS Student Sabbatical, Telecommuting and Geographic Stability Dollar Values**

**Question #18: List any other incentive(s) that the Navy can offer and the amount of the bonus that you would be willing to give up to receive that incentive.**

**“Out of the box” answers are encouraged and accepted. (Example: Designated parking spot - \$1000.00)**

Results are located in Survey Monkey. Please use the following link to access answers to question 13.

[http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA\\_3d\\_3d](http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA_3d_3d)

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## IV. NPS RESPONDENT PROFILE

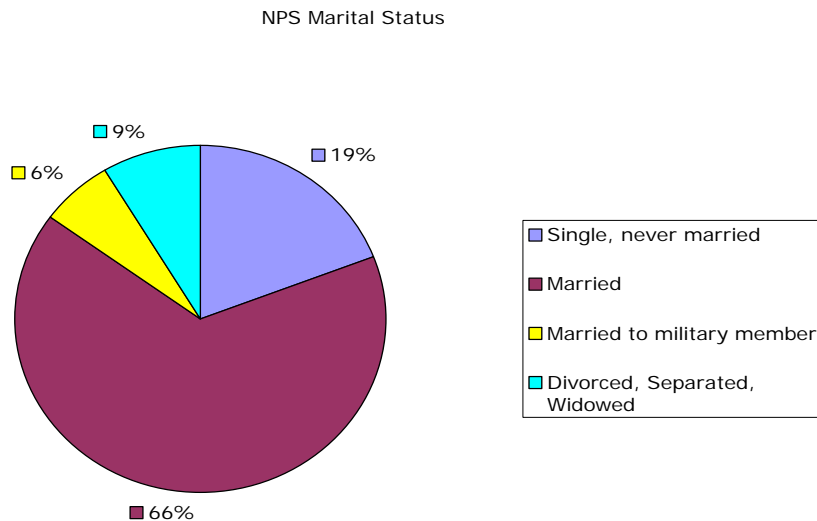
### A. SURVEY METHODOLOGY

The survey was emailed to approximately 180 Surface Warfare Officers at the Naval Postgraduate School using the Surface Warfare Officer Distribution list in PYTHON (an electronic NPS student registration system). There were 53 total responses received from respondents at NPS. A two week deadline was given for participants to respond and there were no survey responses received after the deadline. All Surface Warfare Officers at the Naval Postgraduate School (NPS) have accepted the SWOCP bonus and are obligated to complete two department tours of at least 15 months. Surface Warfare Officers at NPS will be assigned to ships and department head school approximately 6-9 months prior to graduation.

#### **Question #1: I agree to participate in this survey?**

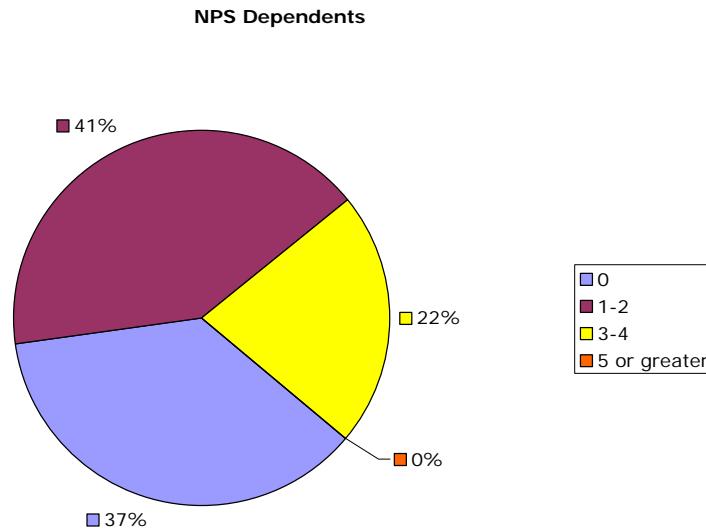
All respondents agreed to participate in this survey.

#### **Question #2: What is your current marital status?**



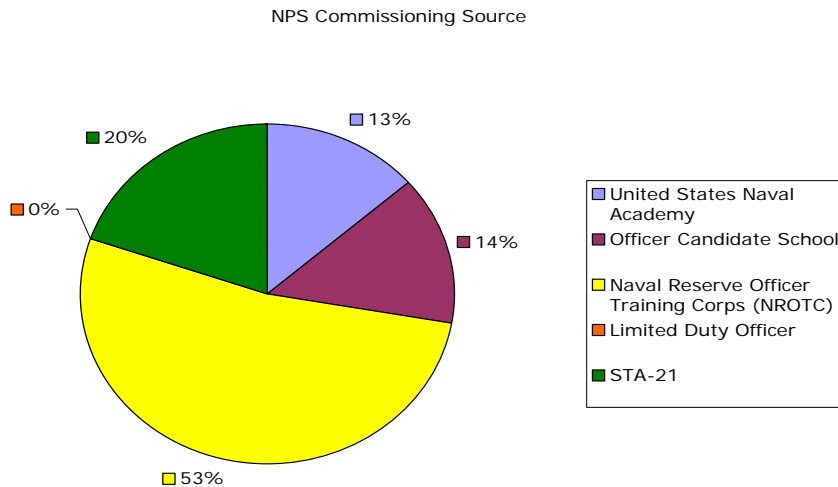
**Figure 16. Survey revealed that 66% of the NPS students are married, 19% are single, 9% are divorced, and 6% are married to other military members.**

**Question #3: How many dependents (not including your spouse) do you have?**



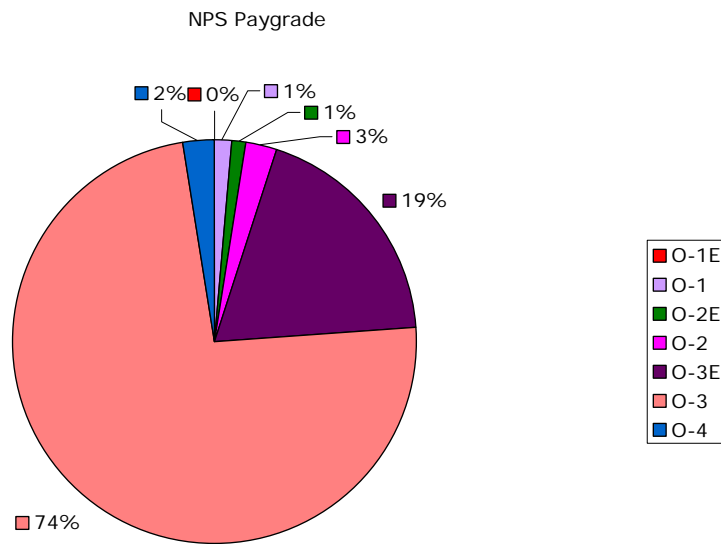
**Figure 17. Total number of dependents by NPS students. 37% of NPS students have 0 dependents, 41% have 1-2 dependents, 22% have 3-4 dependents. No NPS Surface Warfare Officer have 5 or more greater dependents.**

**Question #4: What was your commissioning source?**



**Figure 18. Survey results indicate 53% of the NPS SWO'S received their commission via ROTC, 20% received their commission through the STA-21 program, 14% received their commission through OCS, and 13% received their commission through the USNA.**

**Question #5: What is your current paygrade?**



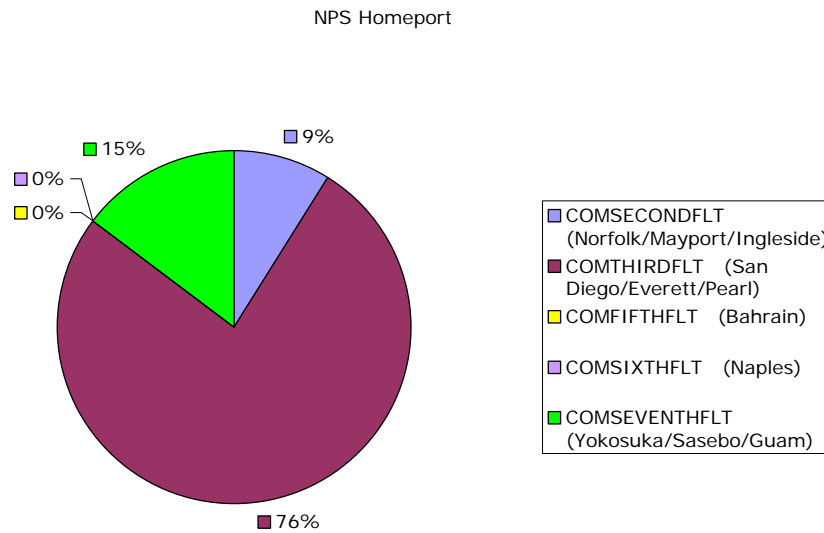
**Figure 19. Breakdown of NPS Student Paygrades. Results indicate that 74% of NPS students are O3, 19% of NPS students are O3E, 3% are O2, 2% are O4, 1% are O2E, and 1% are O1.**

**Question #6: Where are you currently serving?**

All respondents were currently serving as students at the Naval Post Graduate School in Monterey, CA.

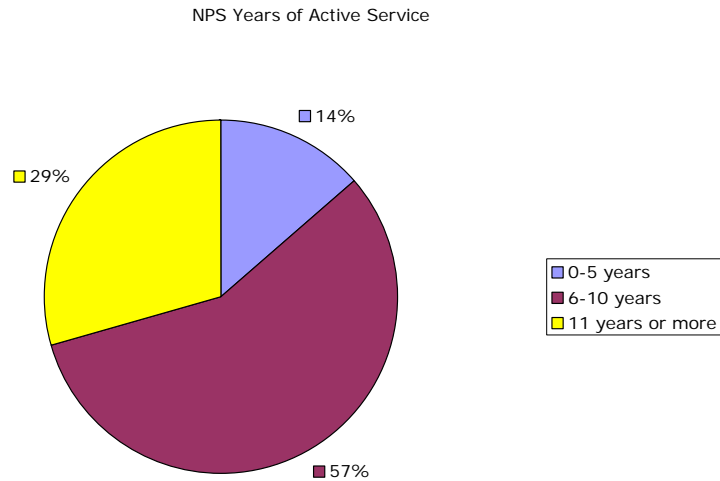


**Question #7: In which fleet is your homeport**



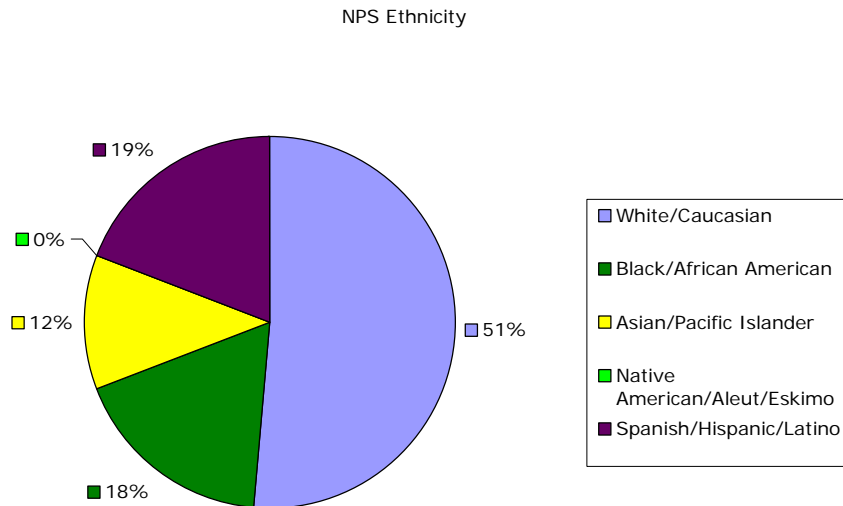
**Figure 20.** Survey results indicate that 76% of the NPS students are currently stationed at the Naval Postgraduate School, 15% of the students are in the COMSEVENTHFLT AOR, and 9% of the students are in the COMSECONDLFT AOR. Students not at NPS are distance learning students or students taking refresher courses to improve their academic profile code prior to enrolling at NPS.

**Question #8: How many years of active duty service have you completed?**



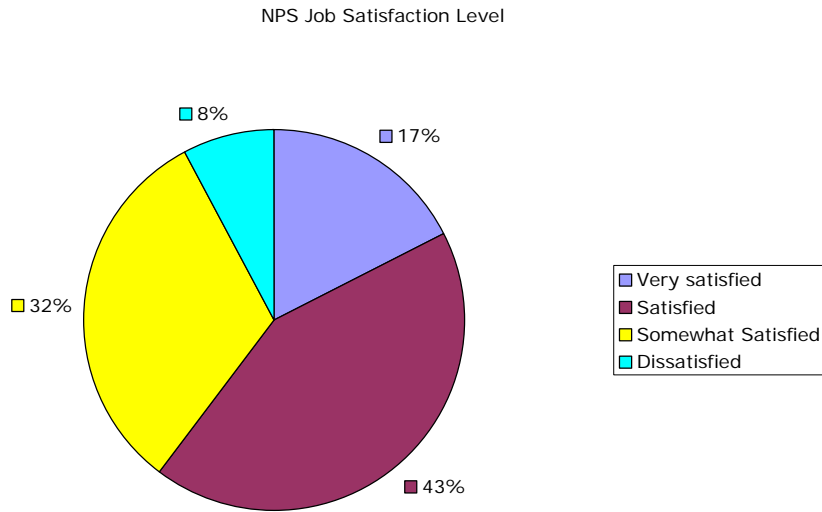
**Figure 21. Average number of active duty service years of NPS Surface Warfare Officers. The results indicate that 57% of NPS SWO'S have 6-10 years of naval service, 29% of NPS SWO'S have 11 years of naval service, and 14% of NPS SWO'S have 0-5 years of naval service.**

**Question #9: What is your ethnic descent?**



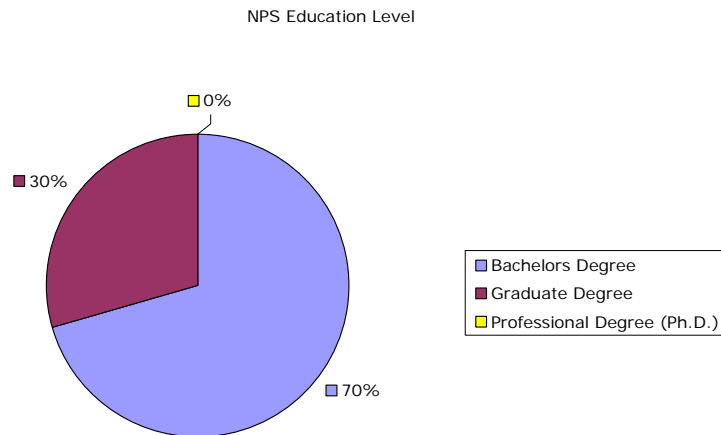
**Figure 22. NPS Ethnicity Overview. Survey results indicate that 51% of NPS Surface Warfare Officers are Caucasian, 19% are Hispanic and Latino, 18% are African American, and 12% are Asian.**

**Question #10: What is your current job satisfaction level?**



**Figure 23. Current NPS Job satisfaction level. Research indicates that only 17% of NPS Surface Warfare Officers are very satisfied with their job, 43% are satisfied, 32% are somewhat satisfied, and 8% are dissatisfied.**

**Question #12: What is the highest level of education you have completed?**



**Figure 24. Current education level of NPS Surface Warfare Officers. Survey results revealed that 70% of NPS graduates have earned a bachelors degree, and 30% have a master's degree. A bachelor's degree is required for admission into the Naval Postgraduate School.**

**Question #13: What was/will be your primary reason for accepting or declining the Surface Warfare Officer Bonus?**

Results are located in Survey Monkey. Please use the following link to access answers to question 13.

[http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA\\_3d\\_3d](http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA_3d_3d)

**Question #18: List any other incentive(s) that the Navy can offer and the amount of the bonus that you would be willing to give up to receive that incentive. “Out of the box” answers are encouraged and accepted. (Example: Designated parking spot - \$1000.00)**

Results are located in Survey Monkey. Please use the following link to access answers to question 13.

[http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA\\_3d\\_3d](http://www.surveymk.com/s.aspx?sm=P60phnT96MRwK6qzb6yvGA_3d_3d)

**1. Overall Evaluation of Survey Responses**

There were several recurring themes related to the attitude that Junior Officers indicated during the survey. These themes can be summarized into the following descriptive categories:

- Lack of time spent with family members
- Work-life balance issues
- Excessive work hours
- Poor command climate
- Micromanagement
- Threat of being selected for Individual Augmentation (IA) assignment
- Overall job dissatisfaction levels

Many junior officers felt that command leadership has no regard for their personal well-being or morale. Due to the department head tour commitments and the opportunity for command, junior officers felt that a DH tour would be more stressful, because your career depends upon performance in the job. The survey also indicated that it is difficult to place a value on the ability to be present for major personal/family milestones such as vacations, family reunions, weddings, class reunions, births and funerals. Junior officers felt that their assigned tasks were repetitive and offered no chance for improvement or innovation. Aviation and staff corps community cultures are more appealing to junior officers because of the high stress mentality of the Surface Warfare Officer Community.

Overall junior officers feel that in order to be a successful Surface Warfare Officer you have to work hard, fill hard sea duty billets, and have a senior mentor who can assist you with the detailing process.

## **2. NPS Responses versus Fleet Responses**

Chapter III uses descriptive statistics to compare the differences between demographics, and monetary and non-monetary responses between Surface Warfare Officers stationed at the Naval Postgraduate School and Surface Warfare Officers stationed abroad onboard naval vessels, who indicated they would accept the SWOCP bonus. The important difference between the NPS respondents and fleet respondents is that all NPS students have committed to SWOCP and are required to serve two department head tours or a single long department head tour. In an attempt to further validate our survey, we are analyzing the similarities between NPS Surface Warfare Officers and the top 45% of fleet respondents who indicated they would accept the SWOCP bonus. Our survey revealed that graduate education, SWOCP, and geographical stability have a positive effect on an officer's decision to remain in the Surface Warfare community. Respondents who indicated that they were leaving active duty were currently serving in their second division officer tour. Both NPS and fleet respondents agreed with the implementation of SWOCP but the amount of the bonus varied. We attribute this to NPS students being already committed to department head tours, the current SWOCP and JO CSRB amount, and the fleet respondents delaying acceptance of the bonus, due to anticipation of an increase. U.S. Code Title 37, Sec 323 states that an officer may receive multiple retention bonuses but not a total amount more than \$200,000. NPS and fleet Surface Warfare Officers who have signed a SWOCP contract regardless of race, years of service, and commissioning source listed the bonus and graduate school as their primary reason for continuing service in the SWO community. PERS-41 has made NPS their primary choice of shore duty stations for officers who have completed their second division officer tour. Listed below are the commonalities between Surface Warfare Officers stationed at the Naval Postgraduate School and those stationed abroad onboard various naval vessels:

### **3. Similarities**

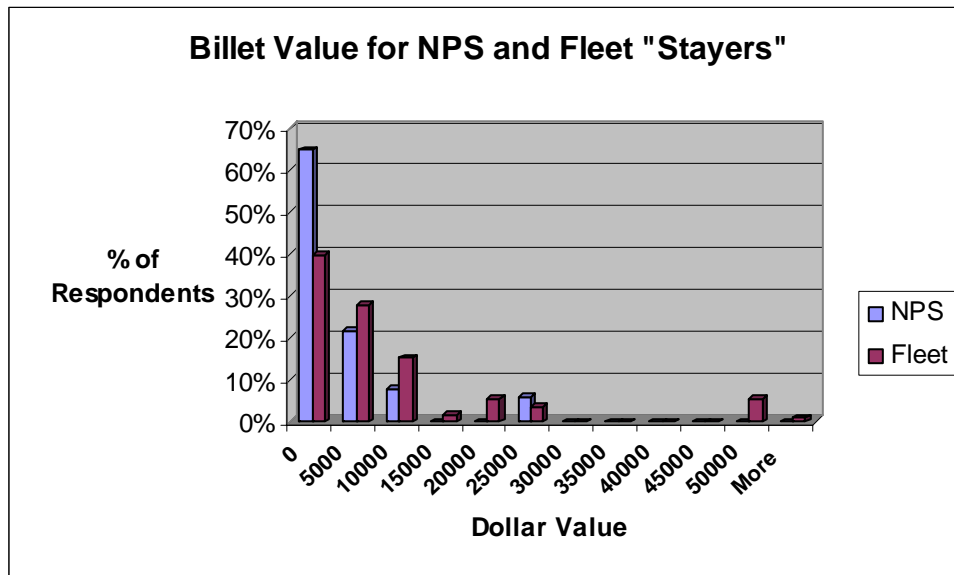
- Graduate Education Opportunities
  - Surface Warfare Officers are eligible to attend the Naval Postgraduate School, Naval War College, and civilian universities provided they meet entrance criteria. Since graduate education is weighed heavily in the selection board and promotion criteria both NPS and Fleet respondents placed a high value on obtaining a masters degree.
- Anticipation of an increase in monetary incentives (Compensation)
  - While the current SWOCP amount is \$50,000 dollars and JOCSRB is \$25,000 dollars, NPS and Fleet Surface Warfare continue to hear discussions amongst senior community leaders concerning raising the amount of the bonus. This may cause officers to delay the signing of the SWOCP contract until they are forced to sign prior to the issuance of permanent change of station (PCS) orders. If an increase, is granted it is highly likely that it will be retroactive.
- Foreign language training opportunities
  - In an effort to increase career timing efforts, and the strain on the department head school schedule, the SWO community has began to offer foreign language training to NPS graduates if their career timing supports.
- Family commitment
  - All NPS and Fleet respondents wanted to increase their time spent at home with their families. They indicated that no amount of money could replace the time lost with family.
- High operational tempo
  - The lack of concrete ships schedules, the fleet response plan, and extended deployments were common amongst both respondent sets for not accepting the Surface Warfare bonus.
- G.I. Bill opportunities
  - The Montgomery G.I. Bill is only eligible for graduates of Officer Candidate School. Graduates were grouped by commissioning source such as NROTC, USNA, and OCS. Respondents who declined to accept SWOCP indicated their plan to use the G.I. Bill to pay for their graduate school.

- Geographical stability
  - NPS and Fleet respondents indicated that geographical stability was one of the most important reasons for accepting SWOCP. Although not an official incentive, this opportunity provides officers the ability to purchase a home, secure a job for a spouse, and allows their children to attend the same school without the chance of transferring schools prior to the end of the school year.

#### **4. Differences**

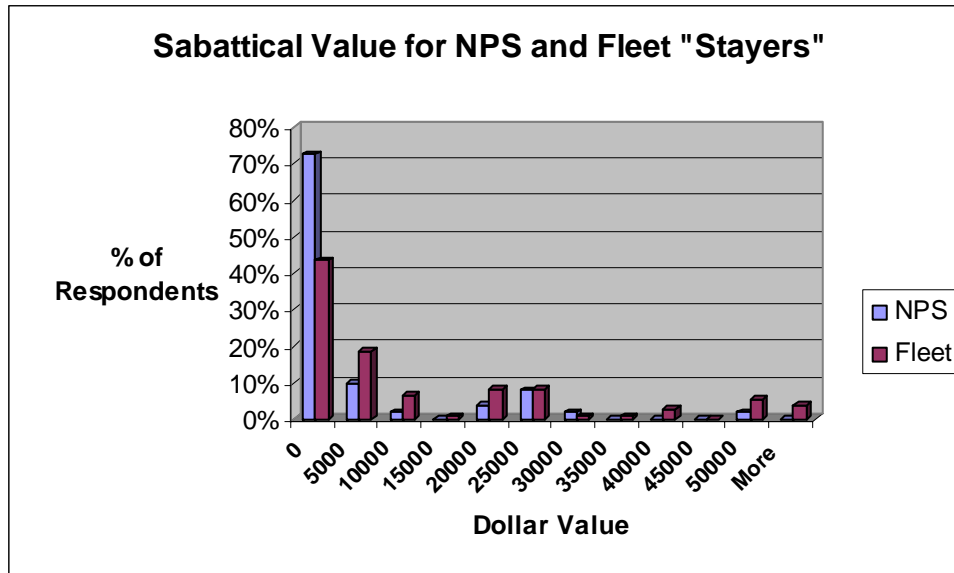
- Job Satisfaction
  - NPS and Fleet Surface Warfare Officers are vastly different in their levels of job satisfaction. A key contributing to this result indicates that junior officers have a wide range of responsibilities, while NPS Surface Warfare Officers primary responsibility is school.
- Working Environment
  - NPS and Fleet Surface Warfare Officers work environments are completely different. NPS officers are in an academic environment while fleet Surface Warfare officers are either at sea or inport. Ships have continuous bells, alarms, and whistles that are used to signify drills and evolutions. At or sea or inport working hours are typically eight to twelve hours a day, while NPS students have a typical six hour per day of class time.
- Relationships with superiors and subordinates
  - There is a distinct difference between the chain of command at NPS and fleet Surface Warfare Officers. At NPS the chain of command is considered administrative, while the fleet chain of command has an operational and administrative chain of command who make tactical, operational, and administrative decisions regarding ships, weapons systems, and sailors.
- Leadership Experience
  - The level of leadership amongst NPS and Fleet Surface Warfare Officer is the same. NPS students have completed two division officer tours and been screened for department head by an administrative board. Most NPS students attended legacy SWOS and have experience in leading two divisions while, fleet Surface Warfare Officers devote most of their time to obtaining their qualifications using computer based training (CBT) and have less time to devote to leading a division. In some cases, NPS students have completed a shore duty tour on a staff prior to arrival at NPS.

In order to see how well the fleet “stayers” compare to those of their NPS counterparts, we analyzed the results for a small portion of our fleet sample. This small portion consisted of the 45 percent of those most willing to stay navy and having the lowest monetary bonus requirements. We used 45 percent because this is the percentage of SWOs that must be retained starting in fiscal year 2008 in order to meet future Department Head goals. Our goal was to see if the answers of our fleet “stayers” mirrored what we saw from our results of NPS students who by definition are all “stayers.” Our expectation was that we would see that they were similar in how they valued non-monetary incentives. What we found however, was not the case. We were surprised to learn that the fleet “stayers” placed greater value on non-monetary incentives than did their NPS counterparts. We specifically looked at the non-monetary valuations of job assignment (billet), sabbatical, telecommuting, geographic stability, homeport and ship type.

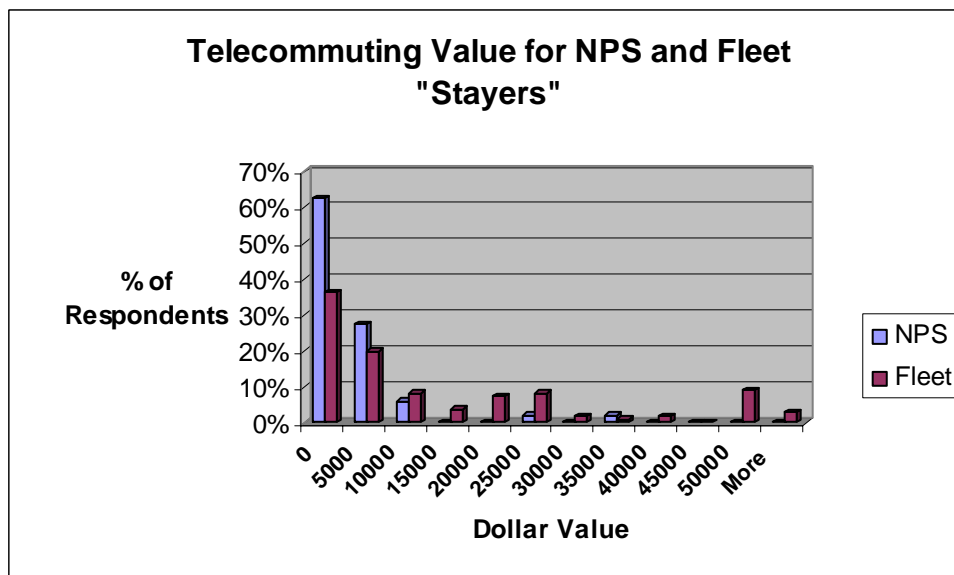


**Figure 25. Billet Value for NPS and Fleet “Stayers”**

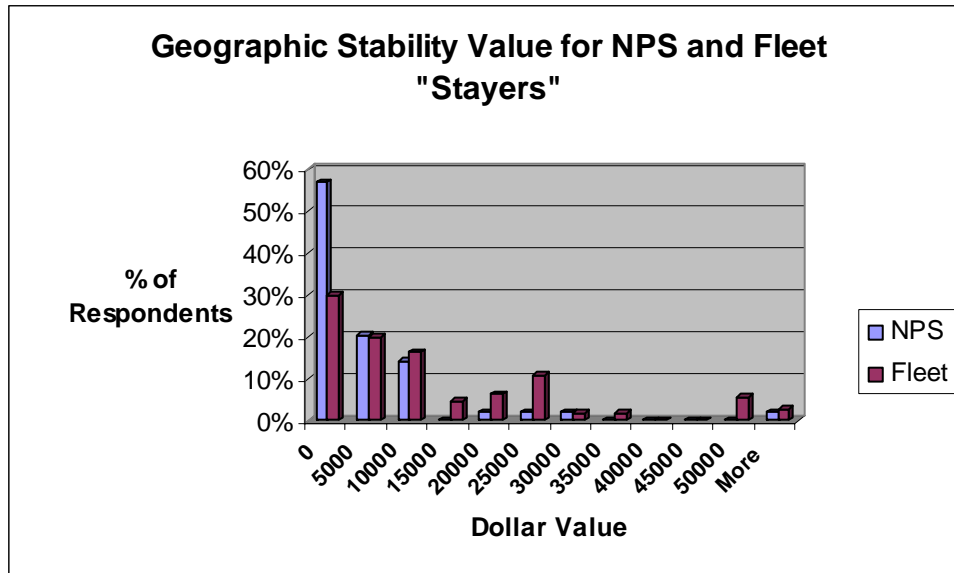




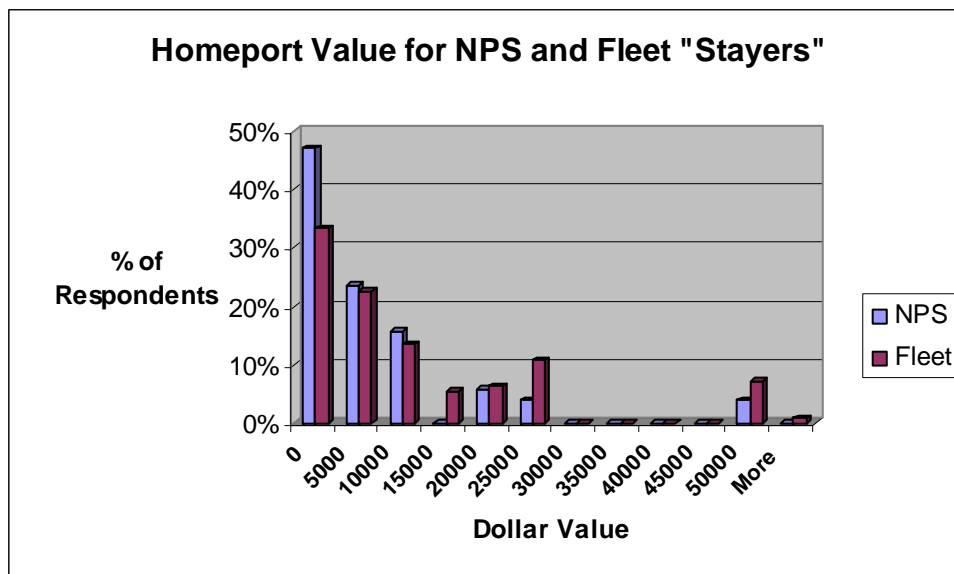
**Figure 26. Sabbatical value for NPS and Fleet “Stayers”**



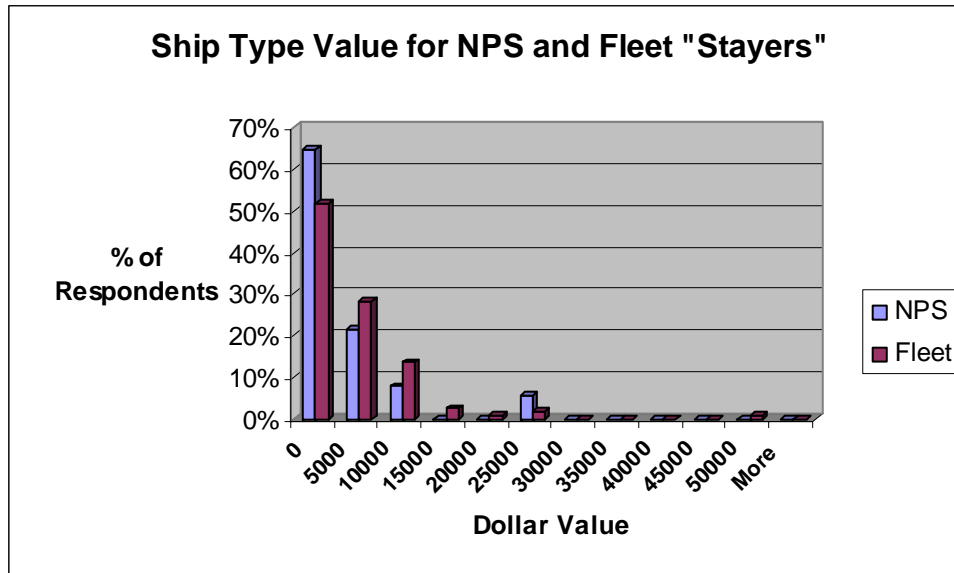
**Figure 27. Telecommuting value for NPS and Fleet “Stayers”**



**Figure 28. Geographic stability value for NPS and Fleet “Stayers”**



**Figure 29. Homeport value for NPS and Fleet “stayers”**



**Figure 30. Ship type value for NPS and Fleet “Stayers”**

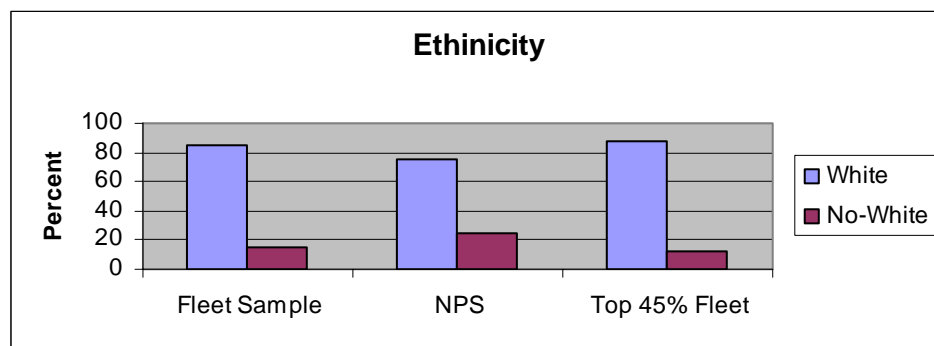
These results serve to reinforce our hypothesis that monetary incentives can only be a part of the overall SWOs retention strategy. The importance of non-monetary incentives such as Homeport, Billet and Ship Type etc. cannot and should not be underestimated.

Some of the reasons for the increased importance on non-monetary incentives from the fleet might stem from the fact that they are serving in very demanding operational assignments with extended time away from family and friends. This could well cause the fleet “stayers” to look at the Navy more pessimistically and therefore require them to demand more monetary and non-monetary incentives in order for them to continue their SWO careers. Anyone serving aboard ship would certainly understand this thought process. Our NPS students have presumably been out of the operational environment for some time and may look more favorably and optimistically on how they value monetary and non-monetary incentives, thereby causing them to not reveal their true worth for each.

Another influence may be the generational gap between the fleet “stayers” and the NPS students. Those serving aboard ship at the time of our survey may be between as many as five to seven years junior to their NPS counterparts. As such, they may certainly

place a higher value on time spent away from family and friends as well as the rigors of sea duty. As these officers represent the future of the SWO community, the Navy SWO leadership should not ignore the changing preferences in the next generation of SWOs. If their needs are not taken into consideration early in their commissions, then the correct types and amounts of incentives (both monetary and non-monetary) may not be in place when these officers reach the decision point of whether to go on to Department Head jobs or exit the Navy. Ignoring these changing attitudes and values would only serve to exacerbate the current problems of SWO retention and place unnecessary additional burdens on the existing SWO infrastructure.

Community diversity within the SWO community has historically ranged about 75% White and 25% Non-White. Non-White is categorized as Black, Asian, Native American, Spanish/Hispanic/Latino, and/or Other.

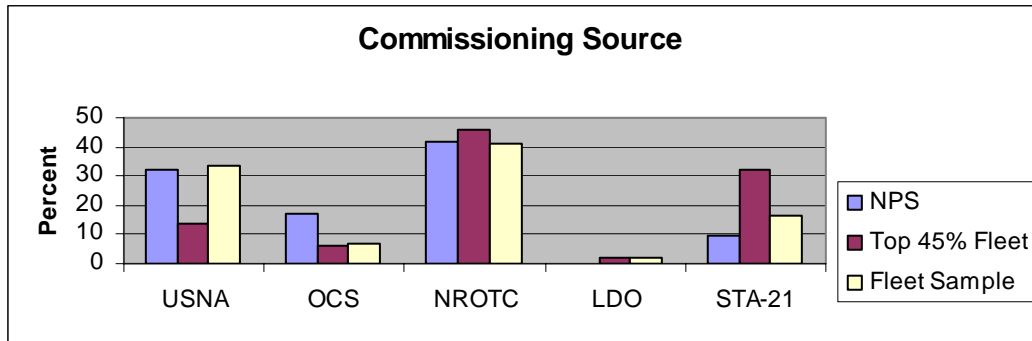


**Figure 31. Fleet and Survey Ethnicity Percentages**

Diversity among NPS students is 75 percent White and 25 percent Non-White. However, diversity among the top 45 percent of fleet “stayers” is 87 percent White and 13 percent Non-White. The SWO community will need to take a more aggressive look at meeting the CNO’s Diversity objective with “next generation” officers. There is no direct correlation to ethnicity and preferred incentives.

The United States Naval Academy, USNA, has historically had a higher attrition rate than any other commissioning source within the SWO community. USNA graduates are required to complete a five year minimum service obligation, while officers from

other accession sources are only required to complete a four year service obligation. Despite the vast difference in education cost to the Navy, USNA officers exit the Navy at a higher percentage than officers accessed through other commissioning source. Our data supported this point, as well.



**Figure 32. Commissioning Sources Percentages**

The 20 percent difference in USNA graduates for NPS students and fleet “stayers,” indicates USNA graduates required a higher monetary bonus (approximately 32 percent required a higher bonus) than the top 45% top of fleet “stayers.”

There were 111 fleet respondents (43% of fleet respondents) that stated “no amount” of money could persuade them to commit to Department Head tours, 82 respondents gave specific reasons. A few reasons noted were the community’s and command’s lack of concern for quality of life, high operational requirements, poor leadership/mentorship, many of these have already been addressed in this study and previous studies. So what can the SWO community do to retain the officers that stated “no amount of money” would persuade them to complete two Department Head tours?” There are three common incentives stated by these officers that might persuade them to complete two DH tours. The first incentive is to decrease the amount of inport working hours, which would improve quality of life issues. The second incentive is to decrease deployment/underway schedule. The third incentive is to have a command climate and leadership that is concerned about the professional development and personal concerns of their people (both officers and enlisted) more than the leaders’ personal career.

## **V. APPLICATION OF REVERSE COMBINATORIAL AUCTION UTILIZING SURVEY REPORTED VALUES**

### **A. USING REVERSE COMBINATORIAL AUCTION WITH SURVEY REPORTED VALUES**

Using the results of the survey previously described, a reverse combinatorial auction can be developed to examine the effects of non-monetary incentives on Surface Warfare Officer retention. To this, a concise description of auction theory is offered. The design and application of a reverse combinatorial auction is described, as is the methodology for determining key numbers used in the auction. The problem of winner determination is discussed. Finally, the results from the auction are discussed.

In applying auction theory to the problem of Surface Warfare Officer retention, there are several factors that must be considered. Most of these will be discussed as they become germane to the analysis, but the most important question is to determine the auction's purpose. The authors have set out to answer the following primary question: what incentive or combination of incentives can the Navy offer that will assist in retaining the required number of department heads? In answering the primary question, it is helpful to break it down into more discrete questions that allow for a methodical treatment. The following questions serve this purpose. If officers are offered the opportunity to choose a package of incentives in place of a uniform cash bonus, can the Navy maintain the current level of retention for less cost? Can more officers be retained at the same price? Optimally, is there a win-win solution: increase retention *and* decrease the cost to the Navy?

### **B. AUCTION THEORY**

The authors used a reverse combinatorial auction to examine the effects of offering a "menu" of retention incentives. The following explanation of auction theory serves to outline the major ideas incorporated into the examination of this question.

Auctions ask and answer the most fundamental question in economics: who should get the goods, and at what price? Most familiar is the ascending price auction,

where many potential buyers submit bids for an item offered by a seller. The person submitting the highest bid wins the auction, and pays the amount bid for the item being auctioned. Ideally, this method serves to allocate the good to the person who values it most, an idea essential to market economies. A variation on this auction is the “second price” ascending auction (usually conducted in a one-time sealed-bid-format, where all bids are viewed simultaneously after the auction closes). This auction modifies the pricing rule as follows: let the winning bidder pay the social opportunity cost of his winnings, rather than his bid. This serves to induce truthful bidding (that is, bidding the highest amount one is willing to pay) as a dominant strategy. The winner (who bid the highest, and thus values the item the most) pays the amount of the second highest bid.

A reverse auction is an auction in which the roles of buyers and sellers are reversed. The primary objective is to drive purchase prices downward. Instead of one seller soliciting bids from multiple buyers and awarding the item to the highest bidder, in a reverse auction one buyer solicits bids from many potential sellers. The winner is the seller who bids the lowest, provided that seller meets any other conditions as determined by the buyer. (To be precise, the bids in reverse auctions are actually “ask” prices, that is, the lowest prices the sellers will accept for the item. However, to minimize confusion, this paper will continue to refer to all entries in an auction as “bids.”) Recently, reverse auctions have been used extensively in procurement applications.

A combinatorial auction is an auction in which buyers can place bids on combinations of items, called “packages,” rather than just individual items. This is useful in that the values placed on an item up for bid can change according to what other items the buyer possesses or is in a position to obtain. In economics terms, the motivation behind the use of a combinatorial auction is the presence of complementarities among the items that differ among bidders. For example, a mobile phone company may value licenses in two adjacent cities more than the sum of the individual license values, because the company’s customers value the ability to roam between both cities.<sup>29</sup>

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<sup>29</sup> Cramton, Shoham, & Steinberg 2006.

A reverse combinatorial auction combines characteristics of reverse auctions and combinatorial auctions. In simplest terms, many sellers offer package bids (combinations of different types of incentives) to a single buyer. This makes the reverse combinatorial auction attractive to apply to the question of SWO retention. It has been shown that certain groups of officers respond more strongly to non-monetary incentives. Thus, the key to retaining more or different officers is to offer combinations of monetary and non-monetary incentives to the pool of officers.

Winner determination is the most vexing aspect of reverse combinatorial auctions. Theoretically, in the population of bids submitted by the potential sellers, there is one that is in effect the “lowest price” bid. The buyer’s task is to determine this winning bid. In practice, this is often extremely difficult, and is usually approached from an operations research or computer science tack. For the purpose of this paper, the authors purposefully defined several assumptions and restricted the scope of the questions asked, allowing for a meaningful treatment of the winner determination problem.

### **C. SURVEY RESULTS: INCENTIVE VALUATION, BIDS, AND COSTS**

To simulate a reverse combinatorial auction, it was necessary to construct a range of bids from potential sellers. In the case of SWO retention, the sellers are the individual officers and the buyer is the Navy. The results of the survey administered by the authors were used to place a value on the non-monetary incentives, construct a range of bids for each of several potential bid packages, and serve as a notional cost of the non-monetary incentives to the Navy.

The survey began by asking what monetary bonus would be required to retain the officer for two department head tours. Following questions asked how much money the officer would give up in return for each non-monetary incentive alone (guaranteed homeport, billet, or ship type.) The next questions asked how much the officer would give up for the three different combinations of two of the three non-monetary incentives, and for all three non-monetary incentives. Finally, three different non-monetary incentives (telecommuting, sabbatical, and geographic stability) were offered separately, asking the same question.



For each combination of incentives, the amount of the monetary bonus the officer would give up can be assumed to be the value of that package of non-monetary incentives to the officer. This assumption is key to the subsequent construction of the auction.

The concept of additive marginal utility was expressly considered in the design of the survey. Simply stated, to any given respondent, a package of incentives could be more (or less) valuable than the sum of its parts to any given respondent. Thus, the authors sought to elicit values for the packages containing multiple non-monetary incentives by asking those questions explicitly. It is worth noting that it is not possible to “deconstruct” these package values to the values placed on individual non-monetary incentive in the package.

Additionally, no mention of a change in detailing process was made in the survey. Thus, any biases present in the officer population based on current detailing processes are likely represented in the reported values. For example, an officer at the top of the pack (and thus almost guaranteed his or her pick of homeports) would likely report a lower value for packages than would the “average” officer.

There is a significant drawback to the method used in the survey to determine the value of the incentive packages. The respondents were asked to state the monetary bonus they would accept to be retained, and this was used as the base amount from which they would give up money in exchange for the non-monetary incentives. 105 of 260 fleet respondents stated at the outset that there is no amount of money that could persuade them to stay in the Navy; thus, they had no basis for valuing the non-monetary incentives and reported no values for the incentive packages. A real-life reverse combinatorial auction (as opposed to the *ex post* auction constructed by the authors from survey responses) would offer the opportunity to place package bids at the outset, potentially offering these “no amount of money” respondents a chance to get what they require in non-monetary incentives to stay in.

The cost to the Navy for each of the non-monetary incentive packages was estimated from the population of values placed on the package by the survey respondents. One can reasonably assume that the cost to the Navy lies at some percentile of the range

of the survey assigned values. By changing the cost (simulating that a different portion of the officer population values the incentive package more than its cost) we can explore the sensitivity of the population to the cost of each incentive package.

It is pertinent here to discuss the difference in non-monetary incentives offered with respect to their cost to the Navy. The three “non traditional” incentives (telecommuting, sabbatical, and geographic stability) have real costs that the Navy would have to pay in addition to the normal costs of sustaining an officer. The other incentives (homeport, billet, and ship type) have no readily quantifiable “accounting” cost to the Navy. That is, in the aggregate, it doesn’t cost the Navy any more to send one officer to a given homeport or billet than it costs to send any other officer. Cost differences in specific instances would essentially balance out. Thus, the only cost to the Navy for the “traditional” non-monetary incentive is an opportunity or “flexibility” cost. Valuation of such a cost is beyond the scope of this paper. For the purpose of this paper, all costs are elicited by defining the portion of officers that would value the incentive package more than it cost. For example, if it is assumed that 25% of officers place a higher value on the sabbatical incentive than it would cost the Navy to provide, the cost of the sabbatical would be defined as the bid at the 75<sup>th</sup> percentile of the population of bids for that incentive.

Bids for each package were constructed from the base monetary bonus requested, the values placed on the non-monetary incentives, and the cost to the Navy of the non-monetary incentives. The formula for this calculation follows later in this paper.

#### **D. DETERMINATION OF REQUIRED NUMBERS**

The survey was administered to two distinct groups, NPS SWOs and junior SWOs afloat. Only responses from the junior SWO afloat group were used in constructing the auctions, as it can be assumed that those responses are a representative sample of the junior SWO community. All NPS SWO respondents have already committed to being retained, so their responses may be considered to be not representative of the community at large.

BuPers has set a goal of 45% retention for YGs 03-06. This is significantly higher than the 31% retention demanded in previous years, due to the smaller size of the recent accession classes. Thus, the entering argument for the auction was to retain 45% of the population. This equates to 117 of the 260 fleet respondents.

Of the 260 responses from junior SWOs afloat, 105 stated that there was no amount of money that would retain them. Due to reasons previously discussed, they subsequently reported no values for the non-monetary incentive packages, and were excluded from the auction. Additionally, officers whose base monetary bids exceeded \$200,000 were excluded, for two reasons. First, most bids in this category were obviously not intended to be taken seriously (several respondents replied with seven—or more—figure bonus requests). Second, there is a \$200,000 Title IX cap on officer bonuses. After removing both the “no amount of money” respondents and the greater than \$200,000 respondents, there remained 144 legitimate bids. The auction therefore seeks to retain 117 of the remaining 144 respondents.

## **E. AUCTION DESIGN**

In brief, a reverse combinatorial auction was constructed using the values reported by fleet respondents by awarding non-monetary incentives to those who valued the incentives more than they cost, and decrementing the initial monetary bonus by the reported value. A detailed description of this process follows. This process is detailed for a notional bidder in Appendix A.

The data from fleet respondents was returned in Excel spreadsheet form. From this master spreadsheet, the population of values for each bid package was separated into sheets. A single auction was constructed that treated the reported incentive values of each survey respondent as a group of bids for those incentive packages.

For each bidder, the auction first considered the value placed on the seven possible combinations of homeport, billet, and ship type. All packages for which the reported value to the officer exceeded the cost to the Navy were compared, and the combination that delivered the highest excess value was awarded. In the case of a tie, the combination containing fewer incentives was awarded.

The auction next looked at the three “non-traditional” incentives of telecommuting, sabbatical, and geographic stability. Awarding these incentives was more straightforward, as no comparison between the three was required. The auction simply awarded the incentive if the reported value (the “bid”) was more than the cost of that incentive.

Given the eight different combinations of traditional incentives (including “money only” as one item in the menu), and the eight different combinations of non-traditional incentives (including “none” as an option), there are 64 unique packages that could be awarded by this auction.

Having determined what incentives to award the bidder, the auction then considered the base amount of cash bonus requested. First, the value reported (the “bid”) for each awarded incentive was deducted from the initially requested base bonus amount, giving an adjusted bonus. Second, the cost of the awarded incentives was added to this adjusted bonus amount, giving the effective cost to the Navy to retain that bidder.

This process was completed for all bidders in the auction. The auction then compared the range of effective costs to the Navy for all bidders, and selected the 117 lowest bidders. The effective cost of the first bidder not retained (the first excluded bid) was set as the cost at which the Navy would retain all bidders that were selected for retention. This first excluded bid served as the new base bonus amount. In other words, the Navy would give each retained officer the amount of the first excluded bid via a combination of cash bonus and awarded incentives, valued at their costs to the Navy. Discussion of the implications of this design follows later in this paper.

After the base amount to be awarded to each bidder retained was determined, the amount of cash bonus for each bidder was determined by subtracting the cost to the Navy of all awarded incentives from the base amount. For comparison purposes, the value received by each bidder was calculated by summing the bids for all awarded incentives and the amount of cash bonus awarded. In several cases, bidders that received relatively small cash bonuses (\$20-30K) were awarded incentive packages that they valued more than ten times that amount.

## **F. IMPLICATIONS OF AUCTION DESIGN**

An appropriately designed auction can elicit truthful bids; that is, it is in the best interest of all participants to bid their true value for each item (in this case, a package of incentives.) There are two implications of auction design to consider in this case: the second price auction format and incentive compatibility.

A reverse second price auction induces truth-telling as a dominant strategy by requiring the winner (the bidder with the highest bid) to pay the amount of the next lowest bid (the “second price.”) In the case of a multiple-winner reverse second-price auction, all winning sellers receive the amount of the next highest (or first excluded or lowest losing) bid. In this auction, after determining the effective cost to the Navy for each bidder, the first excluded bid (the second price) was chosen as the retention price the Navy would pay to each winner. Thus, there is no incentive for a any officer to bid higher or lower than the true amount he or she would require in order to be retained.

An auction is said to be incentive compatible if bidders fare best when they truthfully reveal the amount they value each item in their bids. In the case of this auction, truthful reporting of the value of an incentive package determines only whether a bidder is retained or not; and, if so, whether he or she will receive the incentive package; it does not affect the amount of cash bonus received or total value received. This is because the first excluded bid was used to set a base amount to award each retained bidder, and this amount was decremented by the Navy’s cost of the awarded incentive package, vice the reported value of the package. Thus, two retained bidders may place far different values on the same incentive package, but their cash bonus would be the same. In this auction, truth-telling is a dominant strategy for all bidders.

## **G. AUCTION RESULTS**

Setting the costs for each incentive at the 50<sup>th</sup> percentile (with the exception of sabbatical and telecommuting set at the 60<sup>th</sup> percentile for reason of believability) returns the following results in retaining 117 officers:

First excluded bid- money only (equivalent to cash bonus required without incentives)	\$175,000
First excluded bid- incentives offered	\$101,250
Total cost to retain- money only	\$20,475,000
Total cost to retain- incentives offered	\$11,846,250
Average cash bonus- incentives offered	\$89,402
Average SWO value- incentives offered	\$149,437

**Table 14. Auction Results**

In this case, it is obviously far cheaper for the Navy to retain the 117 required officers using a combination of monetary and non-monetary incentives. The Navy saved an average of \$73,750 per retained officer, for a total savings of 42% (\$8,628,750.) Additionally, the average officer received a total incentive package worth \$60,000 more than the cash bonus alone. Since the officer valued the incentives more than they cost the Navy (a prerequisite for the awarding of the incentive), the Navy saved money and the retained officer gained value—the win-win outcome that was discussed previously.

The above results serve as an example of the principle of the auction approach for one particular case. A sensitivity analysis is useful in analyzing the cost savings to the Navy as a function of varying both the incentive costs and the desired number of officers to be retained. Figure 34 shows the cost savings as a function of both variables. The desired number of officers to retain ranges from 60 to 130 in increments of 10, and the cost of the incentive ranges from 0% to 100% in 10% increments.

The sensitivity analysis allows several useful observations. First, as the number of officers to be retained increases, the savings increase significantly. Specifically, there is a significant jump in savings when going from 100 retained to 110 retained. This is to be expected: if the Navy is retaining relatively few officers, it can choose to retain the cheapest. Savings from non-monetary incentives will be more modest for these less expensive officers. As the number of officers to be retained increases, the available

officers become more expensive. At this point, the potential for cost savings to the Navy increases significantly as these more expensive officers elect to take non-monetary incentives in lieu of cash.

There is a large drop in savings as the incentive cost rises above 50%, whereas cost savings is relatively stable in the 0% to 50% range. This is directly attributable to the approach used to elicit the values of the incentives. A fair amount of survey respondents indicated a value of zero for many of the incentives. This skewed the population later used to determine cost, so that up to 50% of the values for any given incentive were very close to zero. Once the cost of the incentive rises above 50%, the cost savings diminish as expected.

Finally, the results from the sensitivity analysis serve to emphasize the tremendous power of this approach to deliver the win-win combination of significant savings to the Navy and concurrent significant increases in value to the officers. In every case, the average officer receives more value than the Navy has to pay for, and the Navy saves a significant amount when compared to the amount of money that would be required to retain the officers without the non-monetary incentives.

## **VI. SUMMARY, CONCLUSIONS, AND FUTURE RESEARCH**

### **A. SUMMARY AND CONCLUSIONS**

The results of our survey revealed several important facts about officer retention, many of which have already been noted in previous studies. The most common community dissatisfiers identified in our study were still the imbalance between work and family life and overall community dissatisfaction. Many officers stated that the current retention monetary bonus system is inadequate and does not provide enough compensation to overlook community displeasures, such as poor command climate and excessive in-port working hours. However, non-monetary incentives, such as geographical stability and in-port telecommuting, were popular alternative retention incentives suggested by survey respondents that would provide adequate compensation to persuade retention. Non-monetary retention incentive creates a “win-win” opportunity for both the Navy and the officer.

Non-monetary incentives provide the major link between the SWO community retaining the “right” officer at the greatest cost savings to the Navy. The results of our combinatorial model concluded that the optimal retention bonus system should incorporate both a geographical stability option incentive and a monetary option incentive. Establishing a monetary and non-monetary retention bonus system will give the SWO community the needed flexibility, maintain the appropriate quantity and quality of officers and offer cost-savings to the Navy, while providing continued officer satisfaction.<sup>30</sup>

Recently the SWO community has been successful at exceeding department head retention requirements for year groups 2000 and 2001; however these year groups were two of largest officer accession year groups since introduction of the current monetary retention bonus system. Meeting department heads numbers for these two year groups, sent the wrong message back to community leaders. Community leaders believe that a monetary bonus system is the “best” way to meet retention requirements, and have

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<sup>30</sup> Filip, Armed Forces Comptroller, Winter 2007.



proposed to increase the SWO retention bonus to \$100,000. The proposed increase is believed to provide the community with the needed flexibility and ability to maintain the appropriate quantity and quality of officers. But, as noted in our study, money isn't the only motivator to encourage retention.

Due to the Global War on Terrorism and the increasing demand to sustain maritime mission requirements, annual department head requirement have increased from 275. Starting with year groups 2002 and 2003, annual department heads requirements have increased to 281 and 294, respectively. However, while the annual requirement of department heads increased, the number of officer accessions for these two year groups decreased by an average of twenty percent. The SWO community will be faced with the challenge of meeting department head numbers with a smaller pool of officers to choose from. The needed flexibility and ability to maintain the appropriate quantity and quality of officers will be difficult, with the current monetary retention bonus system, especially since 43% of fleet respondents stated that no amount of money would persuade them to commit to two department head tours.

The purpose of this project was to find the optimal combination of retention base incentives, monetary and non-monetary that could increase junior officer retention rates, by providing the greatest value to the officer at the least cost to the navy. A summary of the answers to the specific research questions appears below, followed by recommendations for additional research.

**1. What incentive can the Navy offer in addition to SWOCP that will assist in closing the gap at the Department Head level?**

Survey results revealed the Navy should offer incentives that will improve and stabilize the imbalance between the work and life relationship to close the gap at the Department Head level. This type of incentive should include non-monetary incentives; such as guaranteed homeport selection, geographical stability, telecommuting, and/or a one year sabbatical. These non-monetary incentives often had significantly different values across officers, however, indicating that the "optimal" retention incentive package depended on the individual officer. There is no "one-size-fits-all" ideal retention incentive.

**2. Why are SWOS continuing to leave the Navy prior to their Department Head tours?**

Respondents stated various reasons why they were actually leaving the Navy prior to Department Head tours. The overwhelming reasons were centered on the imbalance between the work and family life relationship and overall community dissatisfaction, such as poor command climate and lack of mentorship.

**3. What incentive(s) do SWOs value the most?**

SWOs value retention incentives that will have the greatest effect on stabilizing work and family life. When comparing guaranteed homeport, ship type, and/or billet selection, fleet and NPS respondents valued the ability to have their desired a guaranteed homeport selection the most. When comparing geographical stability, a one year sabbatical, or telecommuting, fleet respondents valued telecommuting during in-port, non-duty days the most, while NPS respondents valued geographical stability the most.

**4. What value in terms of dollars do SWOs assign to their preferred incentives?**

Fleet respondents valued a guaranteed homeport selection at \$12,000 and NPS respondents valued it at \$6400 (both dollar values are mean values from Tables 3 and 7, respectively). Fleet respondents valued telecommuting at \$20,000 and NPS respondents valued geographical stability at \$5300 (both dollar values are mean values from Tables 5 and 9, respectively). These respondents were willing to forgo \$20,000 on average and as much as one million dollars for the ability to work from home on various days. NPS respondents valued geographical stability the most and were willing to forgo \$5300 on average and as much as \$75,000.

**B. FUTURE RESEARCH**

The survey analysis and model results indicate that there are several non-monetary incentives in addition to SWOCP that may positively influence retention in the Surface Warfare Officer community. Further research must be able to determine the correct combination of SWOCP bonus and non-monetary incentives required to produce the annual department head requirement and retain quality officers. If conducting a

follow-on survey we recommend that a reminder email be sent to all survey participants, all commissioning sources are included such as the U.S. Merchant Marine Academy, and you are able to identify a respondent's gender. Based upon the results, there are several questions and areas that warrant further research such as:

- An analysis of the incentive values between males and females. For example do females place a lower value on non-monetary incentives such as geographical stability, sabbatical, or telecommuting. Our survey did not ask respondents to include their gender. Future surveys will need to capture the gender of respondents.
- What are the primary reasons that Surface Warfare Officers lateral transfer or leave active duty? We recommend that Surface Warfare Officers who are lateral transferring or leaving active duty be interviewed or asked to perform an exit survey detailing their reason for leaving the SWO community.
- Should voluntary separation pay have been offered to the SWO Community? In addition, how many officers from the various commissioning sources such as USNA, OCS, and NROTC accepted voluntary separation pay?
- Conduct further analysis of demographics. Attempt to determine the value minorities and females place on SWOCP and its impact on retention of these officers. Future research should seek to determine the value minorities and females place on non-monetary incentives.
- Creation of a SWOCP model that is similar to a cafeteria auction, where officers would be guaranteed homeport, platform type, and job type but required to accept a reduced SWOCP payment amount.
- Quantify the cost to the Navy for each non-monetary incentive such as telecommuting, geographical stability, and sabbatical.

Several new incentives were recommended to be implemented in the Surface Warfare Community through answers to our open ended questions. We have listed a few of these recommendations below:

- WEPS/CSO billets should be afforded the option to transfer to another ship at the completion of their first department head tour. The ship must be in the same homeport, as to minimize costs to the Navy.
- Grant an additional 15 to 30 days of leave for overseas department head billets.

- Specialize NPS graduates into their designated field of study such as Financial Management, National Security Affairs, System Engineering Analysis or Information Warfare upon completion of department head tours.
- Implement career sea pay for Surface Warfare Officers while on shore duty, similar to the aviation and submarine communities.
- Offer more graduate education opportunities at civilian universities.
- Develop a SWOIP (Surface Warfare Officer Incentive Pay) for department heads serving in Yokosuka and Sasebo. This pay will be similar to Assignment Incentive Pay for enlisted sailors.

Retention of quality officers is not only critical to the Surface Warfare Officer Community but to the U.S. Navy. If retention does not improve, there will not be enough personnel to man the 300 ship Navy envisioned by the CNO. There is no one clear solution to the retention of Surface Warfare Officers. We believe the correct approach is to determine how best to use non-monetary incentives in a way that allows the Navy to meet its SWO retention goals at the minimum cost. Our research revealed that the “optimal” combination of retention based incentives depends on the preferences of the individual officer. Certain non-monetary incentives have high value, on average, to the officer population, but the valuation of the incentives varies significantly and widely across the officer population. Officers should only receive non-monetary incentives when they value those incentives highly relative to the cost to the Navy of providing those incentives. Thus, there is no single “optimal” package of incentives that can be offered to retain all officers; there is a unique optimal package *for every officer* that will increase the value he or she receives and concurrently reduce the cost to the Navy to retain him or her. The approach introduced here is one way of determining what optimized packages might look like. Furthermore, it quantifies the cost to the Navy and the value to the officer. The Navy will continue to aggressively address retention through monetary and non-monetary incentives in the upcoming years to retain high quality officers and meet its annual department head requirements. It is the authors’ hope that this approach might serve useful in this endeavor.

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## APPENDIX A. MODEL SPREADSHEET

		Retained 115	Retained 2	Rejected 6
Cost of 117		Check	117	124
Lowest Bids \$ 100,000				
Cost of \$ 101,250		121		
124 Lowest Bid		22		

		Monetary Bonus	NonMonetary Bonus	SWO Value	Avg. cash
Total cost of cheapest	117	\$ 20,475,000	\$ 11,846,250	\$ 17,484,100	\$ 89,402
Avg. cost of cheapest	117	\$ 175,000	\$ 101,250	\$ 149,437	

Location of cost (percentile) in value population	50%	Cost 5000	Homeport	Retained 106	Retained 11	Rejected 3
Location of cost (percentile) in value population	50%	Cost 0				
Location of cost (percentile) in value population	50%	Cost 1250	Ship	Bonus amount of 117		
Location of cost (percentile) in value population	50%	Cost 10000	Billet	Check 117		
Location of cost (percentile) in value population	50%	Cost 7500	HP and B	Lowest Bids \$ 150,000		
Location of cost (percentile) in value population	50%	Cost 5000	HP and S	Bonus amount of \$ 175,000		
Location of cost (percentile) in value population	50%	Cost 15000	S and B	130 Lowest Bid		
Location of cost (percentile) in value population	60%	Cost 5000	All 3	Retain Target 117		
Location of cost (percentile) in value population	60%	Cost 5000	Sabb			
Location of cost (percentile) in value population	50%	Cost 5000	Telecom			
Location of cost (percentile) in value population	50%	Cost 5000	Geostab			

**Figure 33. Retention Model Cost and Bonus Amounts**

		60% Cost Sensitivity											
		120	0.1										
			0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Monetary Bonus	\$	21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000	\$ 21,000,000
NonMonetary Bonus	\$	12,600,000	\$ 11,399,760	\$ 11,399,760	\$ 11,399,760	\$ 11,460,000	\$ 11,940,000	\$ 12,000,120	\$ 12,600,000	\$ 13,440,000	\$ 15,000,000	\$ 16,800,000	\$ 21,000,000
SWO Value	\$	17,554,601	\$ 19,138,675	\$ 19,138,675	\$ 19,138,675	\$ 18,900,915	\$ 18,953,224	\$ 18,288,260	\$ 17,554,601	\$ 17,372,500	\$ 17,149,100	\$ 17,934,800	\$ 21,000,000
Ave Monetary Bonus	\$	175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000	\$ 175,000
Ave Non-Monetary Bonus	\$	105,000	\$ 94,998	\$ 94,998	\$ 94,998	\$ 95,500	\$ 99,500	\$ 100,001	\$ 105,000	\$ 112,000	\$ 125,000	\$ 140,000	\$ 175,000
Ave SWO Value	\$	146,288	\$ 159,489	\$ 159,489	\$ 159,489	\$ 157,508	\$ 157,944	\$ 152,402	\$ 146,288	\$ 144,771	\$ 142,909	\$ 149,457	\$ 175,000
Ave SWO Cash	\$	91,668	\$ 94,998	\$ 94,998	\$ 94,998	\$ 93,417	\$ 94,983	\$ 91,905	\$ 91,668	\$ 94,242	\$ 103,230	\$ 126,998	\$ 173,167

		Retention Sensitivity										
		10	60									
			70	80	90	100	110	120	130			
Monetary Bonus	\$	21,000,000	\$ 6,600,000	\$ 7,700,000	\$ 8,800,000	\$ 9,900,000	\$ 12,500,000	\$ 19,250,000	\$ 21,000,000	\$ 26,000,000		
Non-Monetary Bonus	\$	12,600,000	\$ 3,660,000	\$ 4,900,000	\$ 6,000,000	\$ 6,840,000	\$ 9,100,000	\$ 11,275,000	\$ 12,600,000	\$ 18,304,000		
SWO Value	\$	17,554,601	\$ 7,589,000	\$ 9,177,700	\$ 10,475,701	\$ 11,415,701	\$ 13,950,601	\$ 16,212,101	\$ 17,554,601	\$ 23,556,101		
Ave Monetary Bonus	\$	175,000	\$ 110,000	\$ 110,000	\$ 110,000	\$ 110,000	\$ 125,000	\$ 175,000	\$ 175,000	\$ 200,000		
Ave Non-Monetary Bonus	\$	105,000	\$ 61,000	\$ 70,000	\$ 75,000	\$ 76,000	\$ 91,000	\$ 102,500	\$ 105,000	\$ 140,800		
Ave SWO Value	\$	146,288	\$ 126,483	\$ 131,110	\$ 130,946	\$ 126,841	\$ 139,506	\$ 147,383	\$ 146,288	\$ 181,201		
Ave SWO Cash	\$	91,668	\$ 42,917	\$ 52,103	\$ 57,821	\$ 60,286	\$ 75,781	\$ 88,115	\$ 91,668	\$ 127,205		

		Cost Sensitivity											
		10	0.1										
		\$ 8,400,000	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
	60	\$ 4,050,000	\$ 4,050,000	\$ 4,050,000	\$ 3,870,000	\$ 3,720,000	\$ 3,539,940	\$ 2,940,000	\$ 2,100,000	\$ 1,200,000	\$ 300,000	\$ -	
	70	\$ 3,850,000	\$ 3,850,000	\$ 3,850,000	\$ 3,850,000	\$ 4,060,000	\$ 3,604,930	\$ 2,800,000	\$ 2,240,000	\$ 980,000	\$ 350,000	\$ -	
	80	\$ 4,200,000	\$ 4,200,000	\$ 4,200,000	\$ 4,000,000	\$ 3,932,800	\$ 3,439,920	\$ 2,800,000	\$ 2,400,000	\$ 800,000	\$ 400,000	\$ -	
	90	\$ 4,005,000	\$ 4,005,000	\$ 4,005,000	\$ 3,600,000	\$ 3,240,000	\$ 3,149,910	\$ 3,060,000	\$ 1,980,000	\$ -	\$ 450,000	\$ -	
	100	\$ 4,900,000	\$ 4,900,000	\$ 4,900,000	\$ 4,950,300	\$ 4,700,000	\$ 4,250,000	\$ 3,400,000	\$ 2,800,000	\$ 1,500,000	\$ 1,900,000	\$ -	
	110	\$ 10,450,000	\$ 10,450,000	\$ 10,450,000	\$ 10,120,000	\$ 9,460,000	\$ 9,020,000	\$ 7,975,000	\$ 7,700,000	\$ 7,150,000	\$ 5,390,000	\$ -	
	120	\$ 9,600,240	\$ 9,600,240	\$ 9,600,240	\$ 9,540,000	\$ 9,060,000	\$ 8,999,880	\$ 8,400,000	\$ 7,560,000	\$ 6,000,000	\$ 4,200,000	\$ -	
	130	\$ 9,100,000	\$ 9,100,000	\$ 9,100,000	\$ 9,100,000	\$ 9,490,000	\$ 9,100,000	\$ 7,696,000	\$ 7,150,000	\$ 4,550,000	\$ 5,720,000	\$ -	0

**Figure 34. Cost Sensitivity Change table includes ranges from 0% to 100%. Retention Sensitivity Change table includes ranges from 60 to 130 for monetary bonus(cost to Navy or value to SWOs), non-monetary bonus( total cost to the Navy), SWO value(total value to SWOs of non-monetary bonuses), Average Monetary Bonus, Average Non-monetary Bonus, Average Value to SWOs, and Average SWO Cash Bonus.**

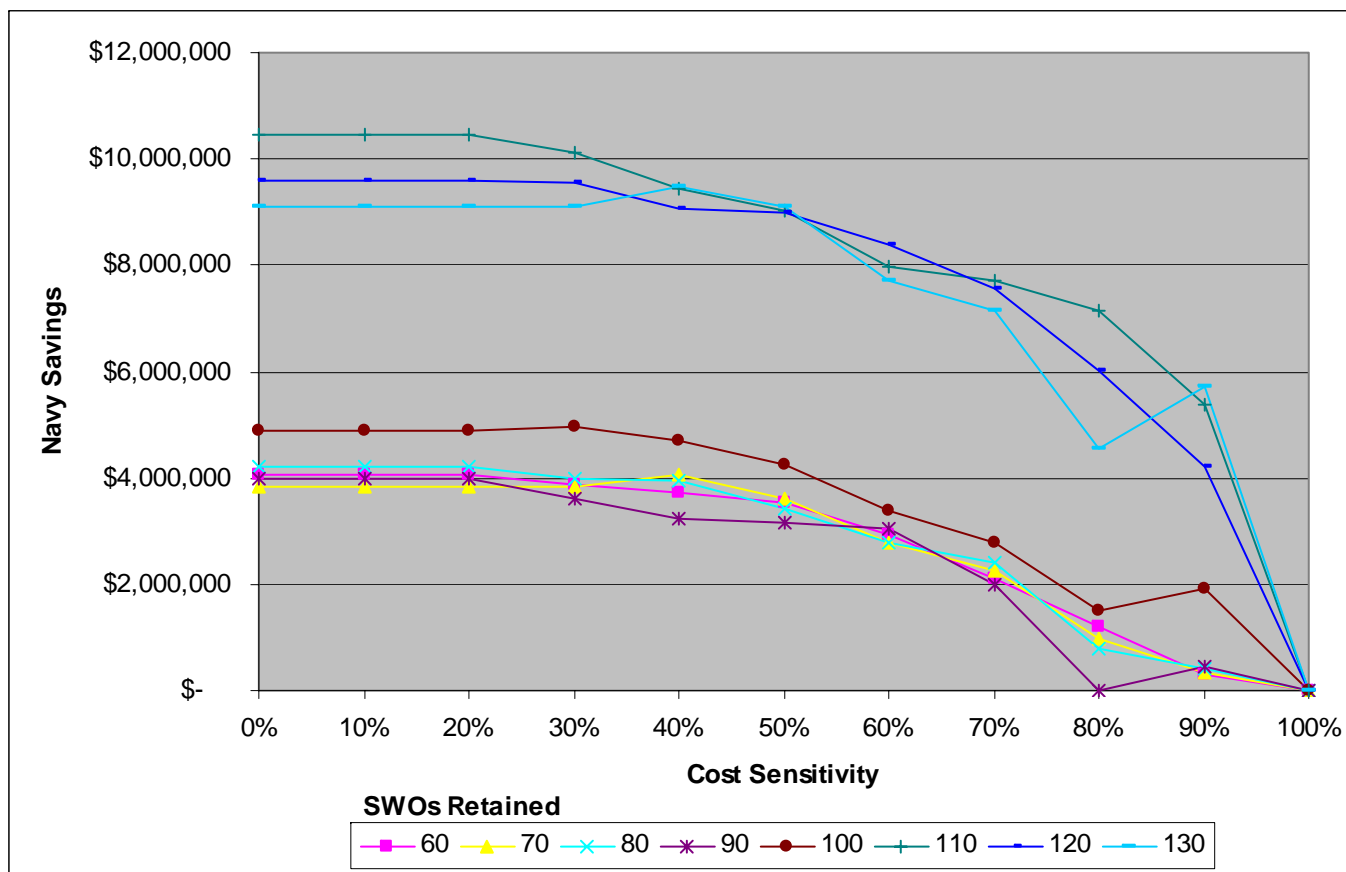
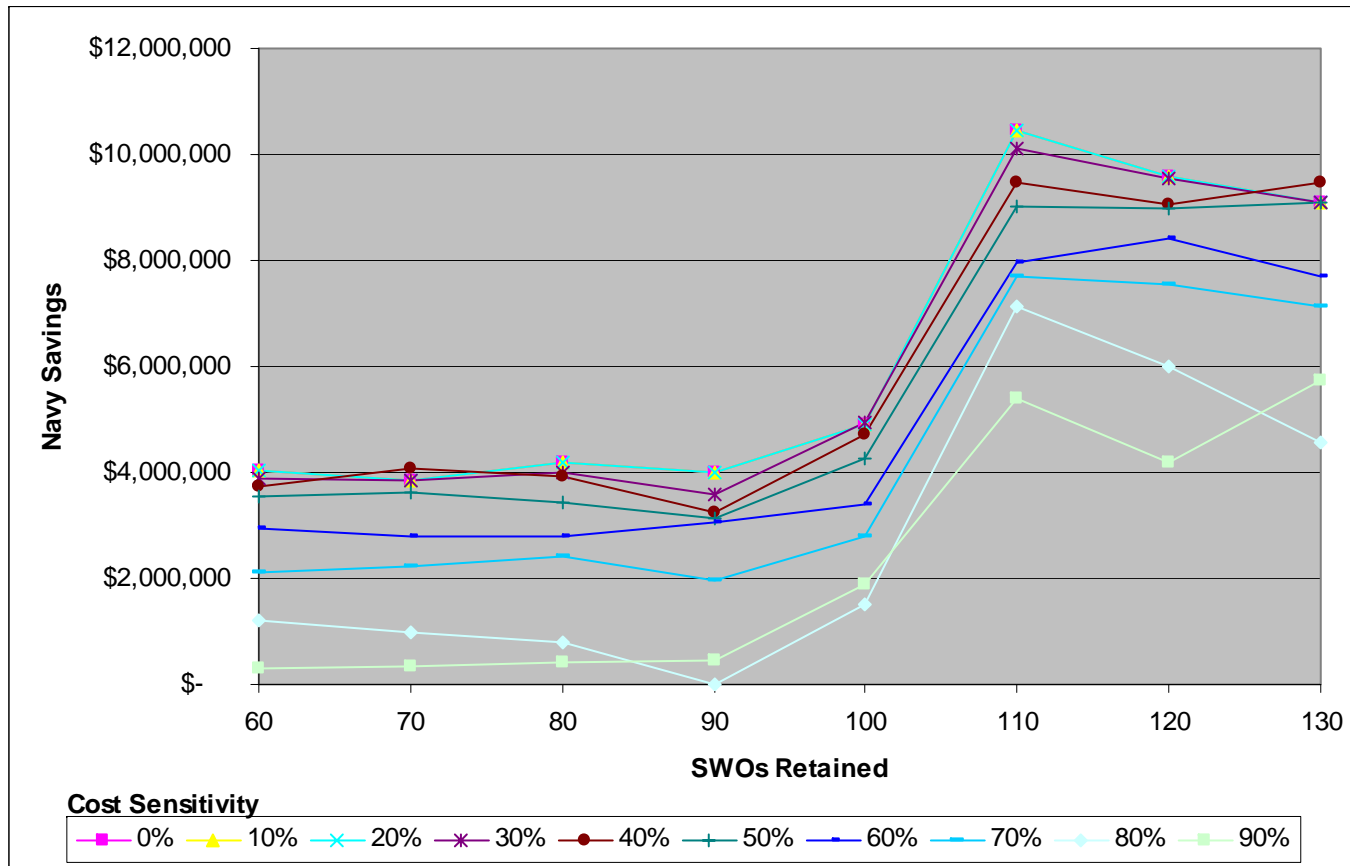


Figure 35. Combined Sensitivity to SWOs retained.



	Bids	Costs	Difference	Awarded	
Base bonus amount	150000				
Homeport	20000	5000	15000		
Ship type	10000	0	10000		
Billet	10000	1250	8750		
Homeport and Billet	25000	10000	15000		
Homeport and Ship	<b>50000</b>	<b>7500</b>	42500	<b>Yes</b>	
Ship type and Billet	20000	5000	15000		
Homeport, Ship type, and Billet	50000	15000	35000		
Sabbatical	<b>10000</b>	<b>5000</b>	5000	<b>Yes</b>	
Telecommuting	<b>20000</b>	<b>5000</b>	15000	<b>Yes</b>	
Geographic Stability	<b>10000</b>	<b>5000</b>	5000	<b>Yes</b>	
Incentive cost to the Navy	(7500	+ 5000	+ 5000	+ 5000)	
	<b>22,500</b>				
Adjusted bonus	150000 -	(50000	+ 10000	+ 20000	+ 10000)
	<b>60,000</b>				
Effective cost to the Navy	(22500	+ 60000)			
	<b>82,500</b>				
First excluded cost to the Navy	<b>101,250</b>				
	<i>This is the equivalent amount all winning bidders will receive.  It was the 118th lowest value among all entries for  "Effective cost to the Navy."</i>				
Adjusted cash bonus	(101250 -	82500)			
	<b>78,750</b>				
Value to the officer	(78750 +	(50000	+ 10000	+ 20000	+ 10000))
	<b>168,750</b>				

**Figure 36. Bid and Associated Value Construction for a Notional Officer**



**Figure 37. Cost Percentage on Savings to the Navy (Monetary Bonus minus Non Monetary Bonus)**

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APPENDIX B. NPS RESULTS

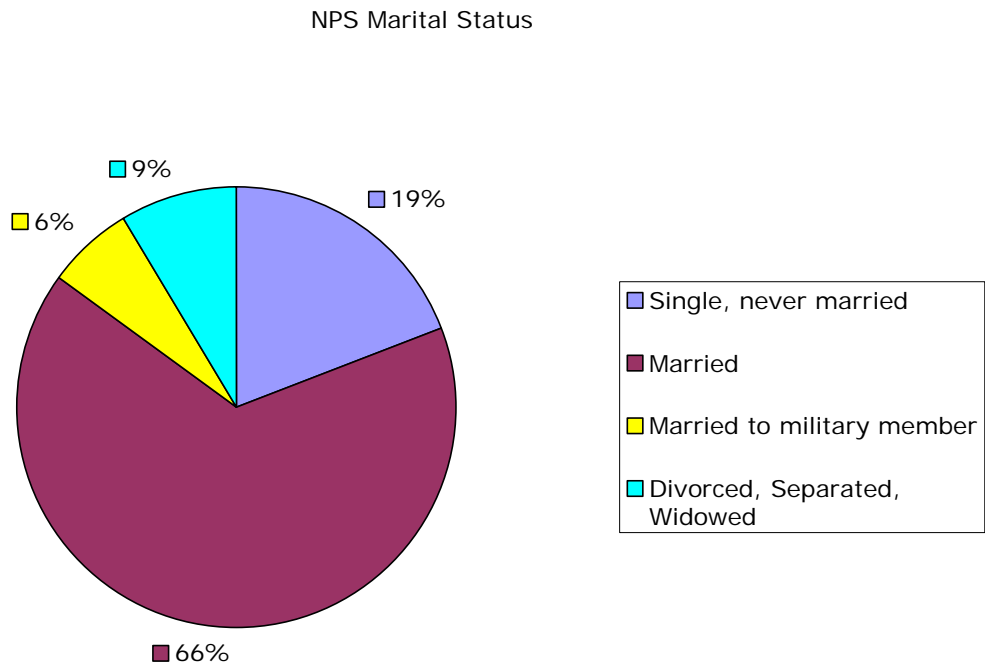


Figure 38. NPS Marital

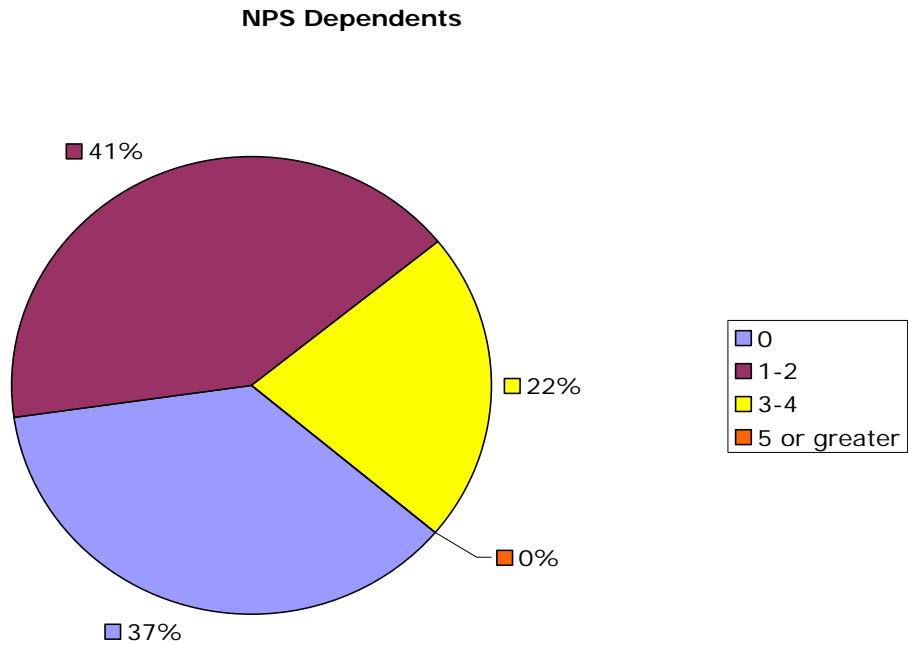
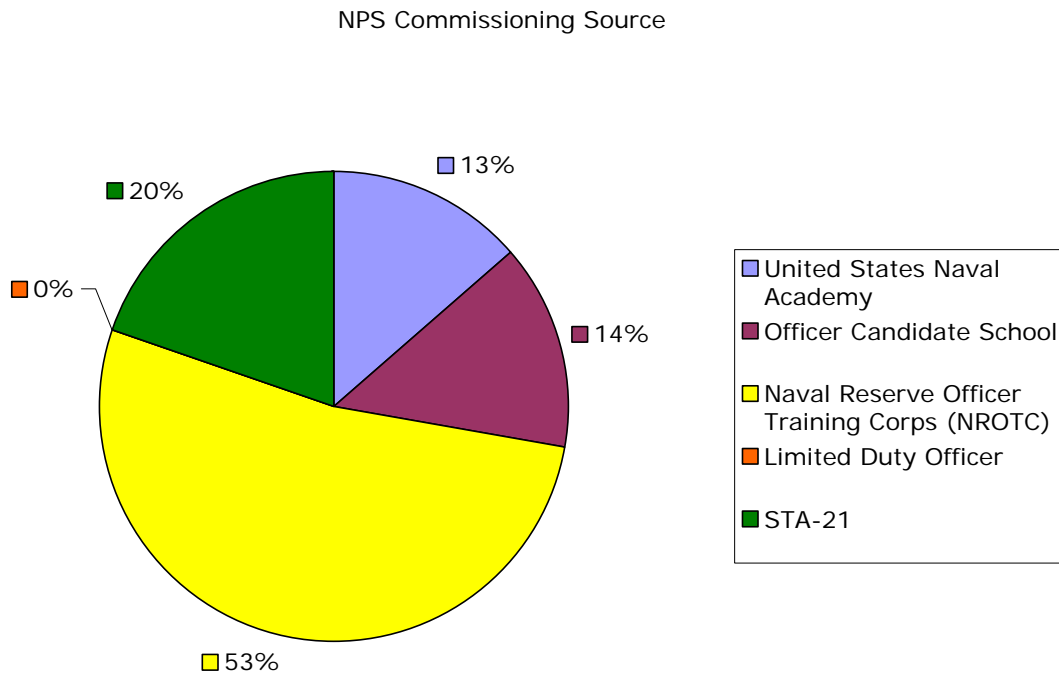
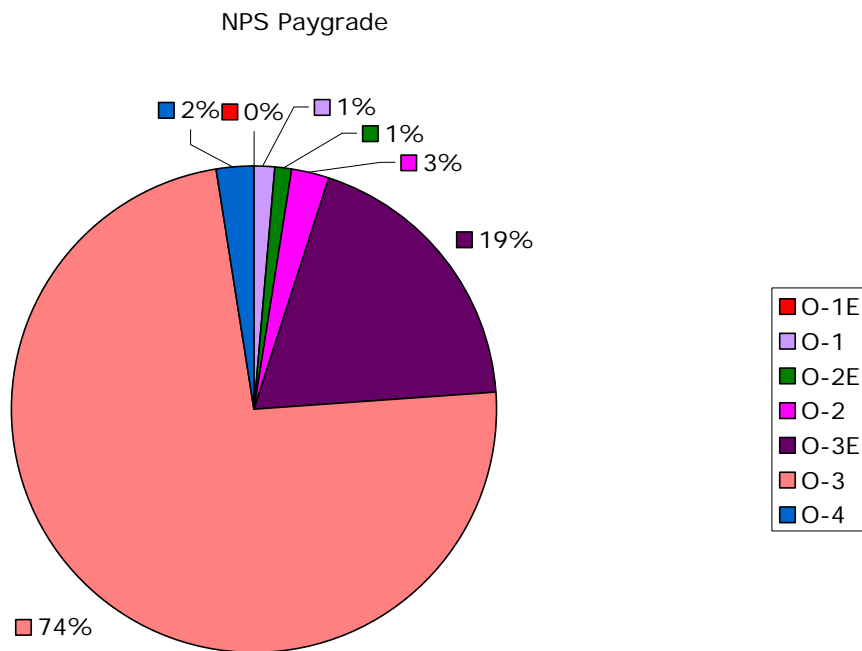


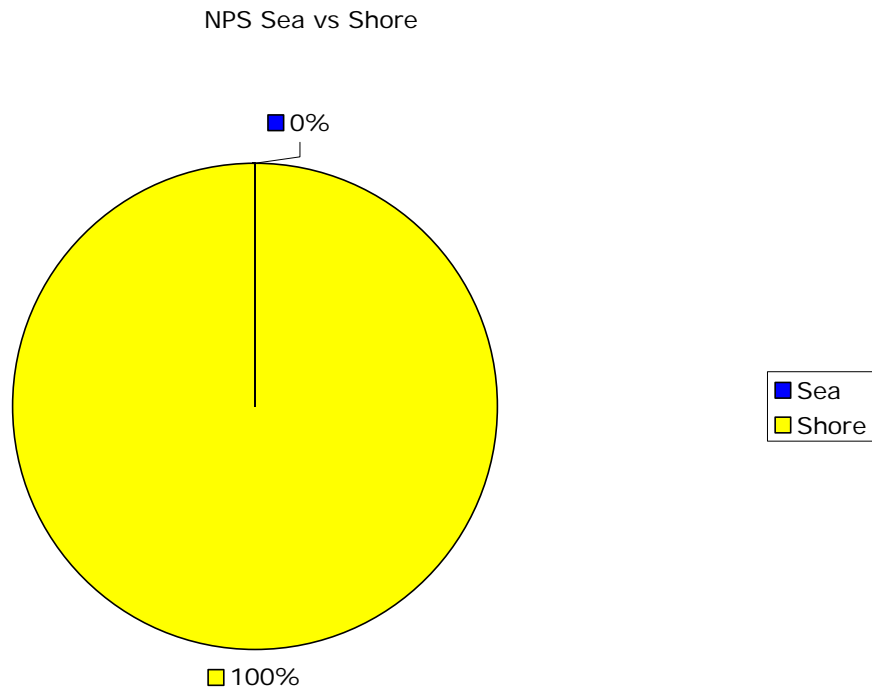
Figure 39. NPS Number of Dependents



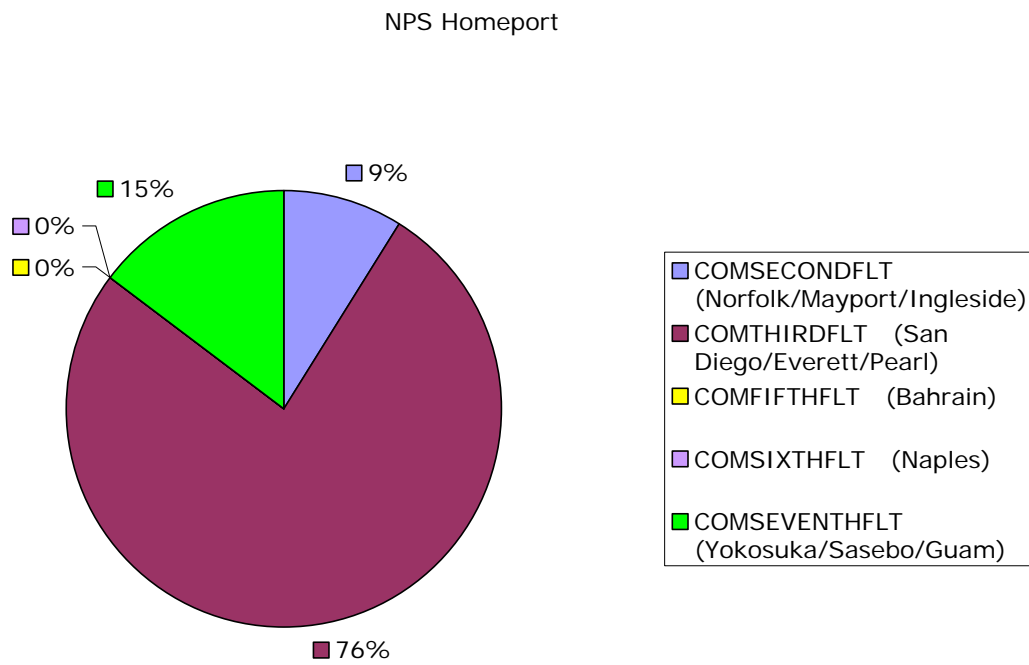
**Figure 40. NPS Commissioning Source**



**Figure 41. NPS Current Paygrade**



**Figure 42. Sea vs Shore Duty**



**Figure 43. NPS Homeport**

NPS Years of Active Service

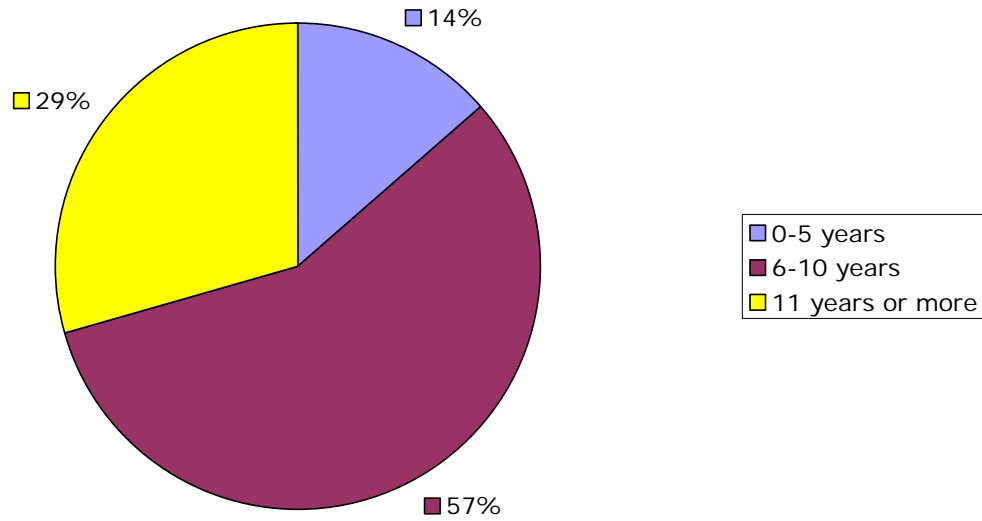


Figure 44. NPS Years of Active Duty Service

NPS Ethnicity

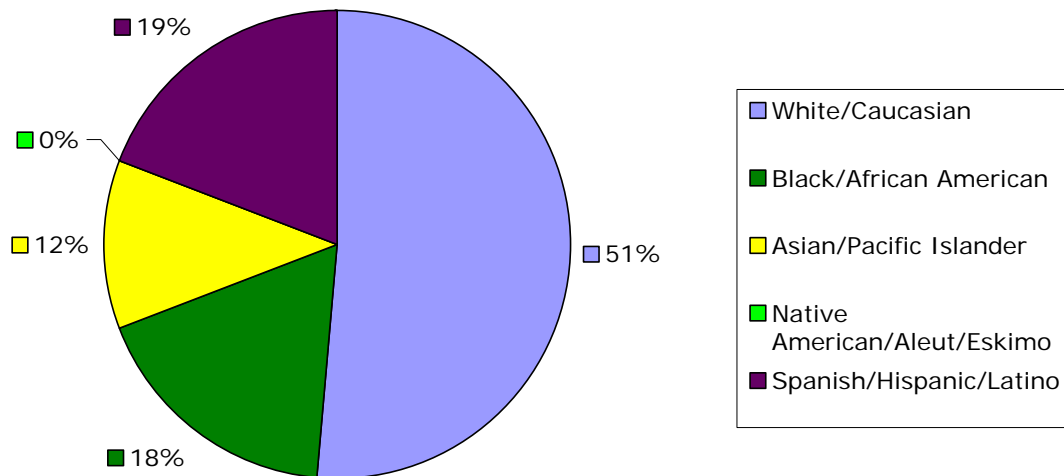
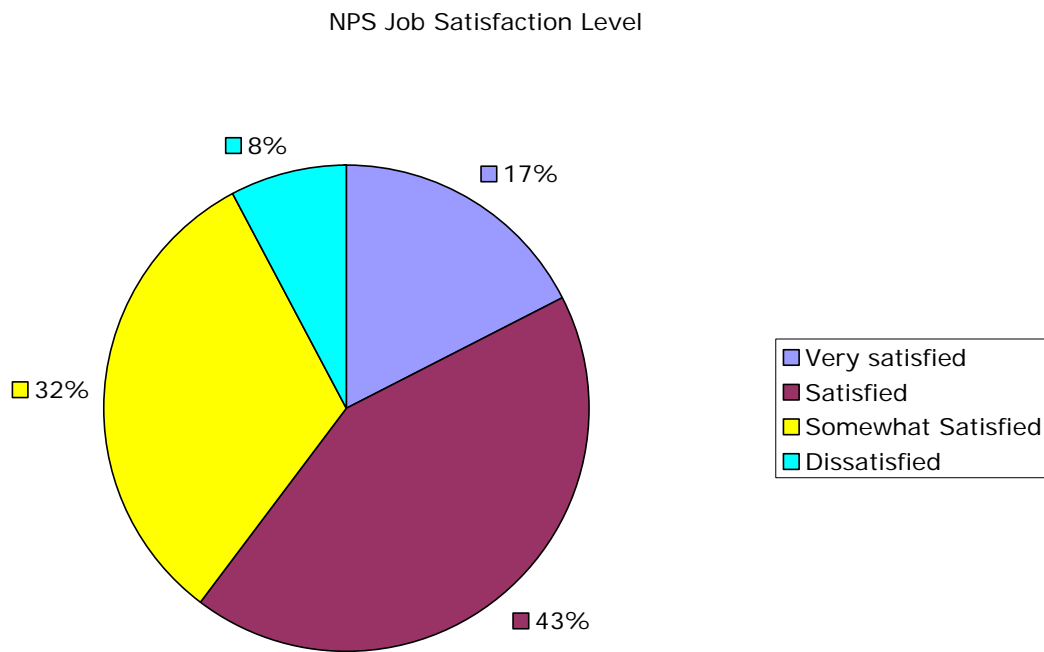
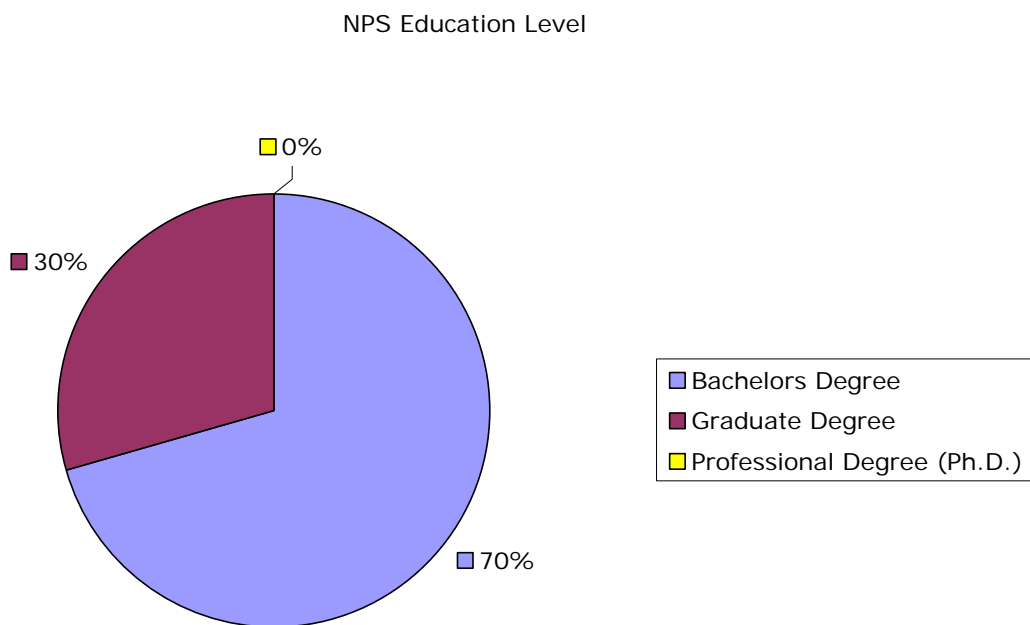


Figure 45. NPS Ethnicity



**Figure 46. NPS Job Satisfaction Level**

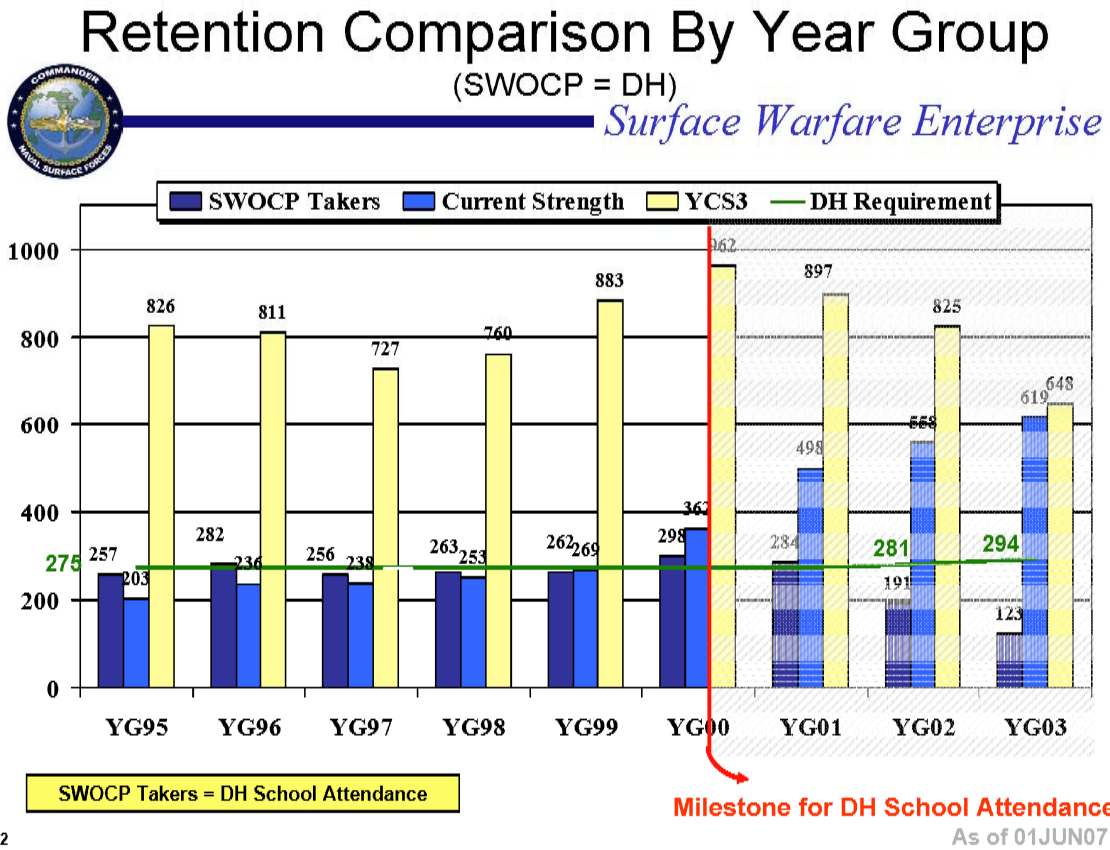


**Figure 47. NPS Degree Level**



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## APPENDIX C. SWO VITAL SIGNS



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Figure 48. SWO Vital Signs – June 2007

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## APPENDIX D. SWO SURVEY

### 1. Participant Consent Section

#### Naval Postgraduate School Participant Consent and Risk Management Statement

**Introduction:** We invite you to participate in our survey entitled "Surface Warfare Officers Survey" being conducted by the Naval Postgraduate School of Business and Public Policy. We appreciate your participation in assessing the current and future state of Surface Warfare Officer Continuation Pay.

**Compensation:** No tangible rewards will be given for completion of this survey. Results of the survey will be available for review upon research completion.

**Procedures:** If you agree to participate in the survey, please complete the survey. The survey will take approximately 10 minutes to complete. Please read each question carefully prior to answering. Questions 14-18 require actual dollar amounts as answers.

**Confidentiality and Privacy Act:** Results of this survey will be kept confidential and all privacy will be safeguarded. Personal identity will not be compromised as a result of participating in this survey.

**Points of Contact:** Should you have any questions or comments regarding this survey, please contact the Principal Investigator Bill Gates, (831) 656-2754, bgates@nps.edu. Any other questions or concerns may be addressed to the IRB Chair, LT Brent Olde, (831) 656-3807, baolde@nps.edu.

**Consent:** I have read and understand the above information. My participation is completely voluntary, and I have the right to withdraw at any time without penalty or obligation. I have asked all questions and have had my questions answered. I agree to participate in this study. I will be provided a copy of this form for my records.

### 2. Survey

#### 1. I agree to participate in this survey?

- ☐ A. Yes  
☐ B. No

#### 2. What is your current marital status?

- ☐ A. Single, never married  
☐ B. Married  
☐ C. Married to military member  
☐ D. Divorced, Separated, Widowed

#### 3. How many dependents (not including your spouse) do you have?

- ☐ A. 0  
☐ B. 1-2  
☐ C. 3-4  
☐ D. 5 or greater

#### 4. What was your commissioning source?

- ☐ A. United States Naval Academy
- ☐ B. Officer Candidate School
- ☐ C. Naval Reserve Officer Training Corps (NROTC)
- ☐ D. Limited Duty Officer
- ☐ E. STA-21

**5. What is your current paygrade?**

- ☐ A. O-1E
- ☐ B. O-1
- ☐ C. O-2E
- ☐ D. O-2
- ☐ E. O-3E
- ☐ F. O-3
- ☐ G. O-4

**6. Where are you currently serving?**

- ☐ A. Sea
- ☐ B. Shore

**7. In which fleet is your homeport?**

- ☐ A. COMSECONDFLT (Norfolk/Mayport/Ingleside)
- ☐ B. COMTHIRDFLT (San Diego/Everett/Pearl)
- ☐ C. COMFIFTHFLT (Bahrain)
- ☐ D. COMSIXTHFLT (Naples)
- ☐ E. COMSEVENTHFLT (Yokosuka/Sasebo/Guam)

**8. How many years of active duty service have you completed?**

- ☐ A. 0-5 years
- ☐ B. 6-10 years
- ☐ C. 11 years or more

**9. What is your ethnic descent?**

- ☐ A. White/Caucasian
- ☐ B. Black/African American
- ☐ C. Asian/Pacific Islander
- ☐ D. Native American/Aleut/Eskimo
- ☐ E. Spanish/Hispanic/Latino

Other (please specify)

**10. How would you describe your current level of job satisfaction?**

- ☐ A. Very satisfied  
☐ B. Satisfied  
☐ C. Somewhat Satisfied  
☐ D. Dissatisfied

**11. Rank the following factors below in order of importance when deciding on permanent change of station orders.**

	Not Important		Neutral		Very Important
Platform Type (CG, DDG, FFG, LSD, LPD)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Location (Homeport)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Billet (OPS, WEPS, CSO, 1ST LT, CHENG)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Housing Availability	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Education Opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impact of Permanent Change of Station on Family Members (Spouse Job Relocation, Schools, and Childcare)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Promotion/Professional Opportunities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**12. What is the highest level of education you have completed?**

- ☐ A. Bachelors Degree  
☐ B. Graduate Degree  
☐ C. Professional Degree (Ph.D.)

**13. What was/will be your primary reason for accepting or declining the Surface Warfare Officer bonus?**

**14. How much money in dollars would you require to commit to two Department Head tours? If there is no amount of money that would persuade you to commit to Department Head tours, please enter "none".**

**15. Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up, if you were guaranteed the following:**

Homeport   
Ship Type   
Billet

**16. Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up, if guaranteed the following:**

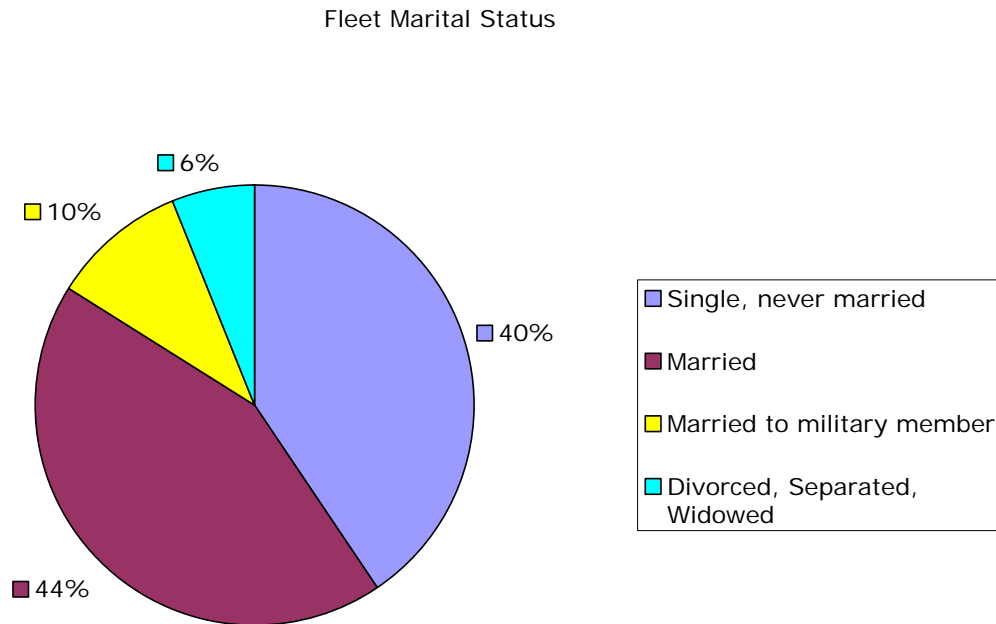
Homeport and Billet   
Homeport and Ship   
Ship Type and Billet   
Homeport, Billet, and Ship Type

**17. Assuming the initial bonus you specified is available to you, how much in dollars would you be willing to give up if guaranteed the following: a one year sabbatical, telecommuting, or geographical stability.  
(Sabbatical is defined as an unpaid year to spend as you wish, while retaining benefits. Telecommuting would allow you to work from home on scheduled days. Geographical stability allows personnel to serve three consecutive years in the same geographical region.)**

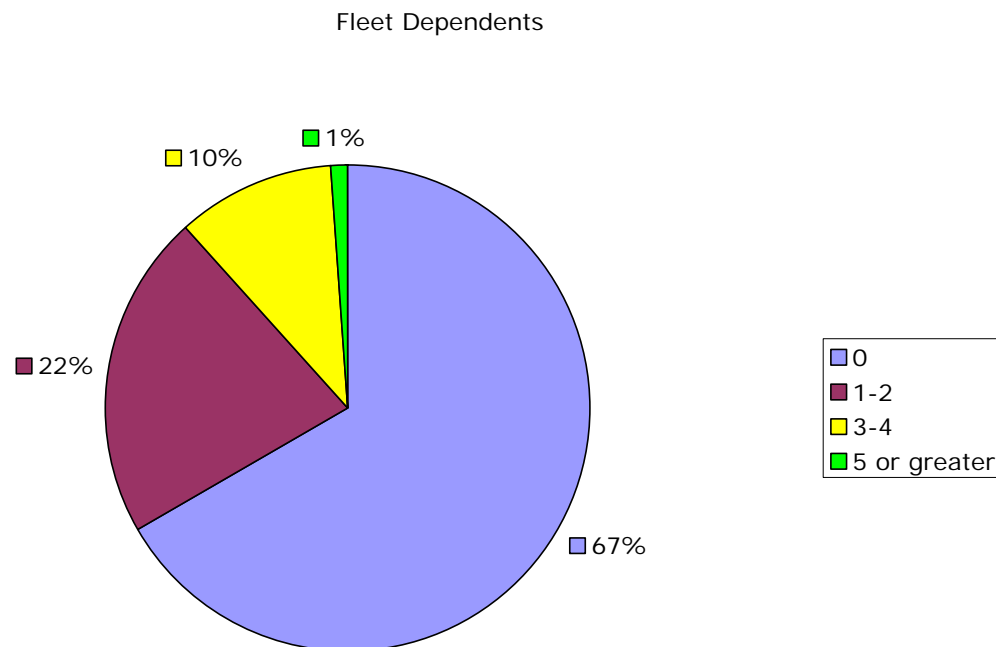
One Year Sabbatical   
Telecommuting   
Geographical Stability

**18. List any other incentive(s) that the Navy can offer and the amount of the bonus that you would give up to receive that incentive. "Out of the box" answers are encouraged and accepted. (Example: Designated Parking Spot-\$1,000 dollars)**

## APPENDIX E. FLEET RESULTS

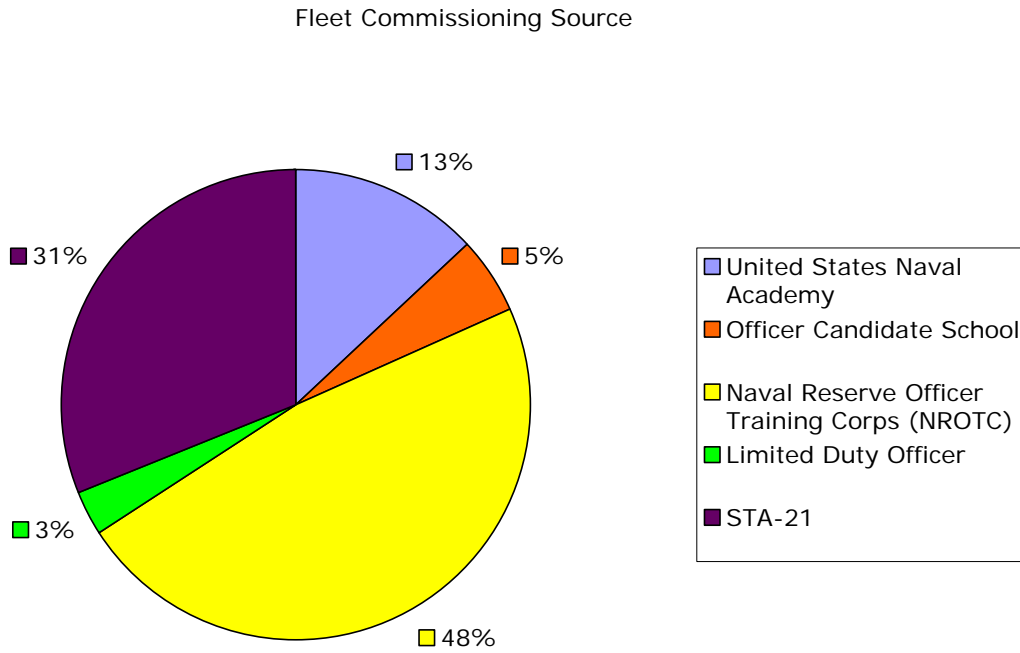


**Figure 49. Fleet Marital Status**

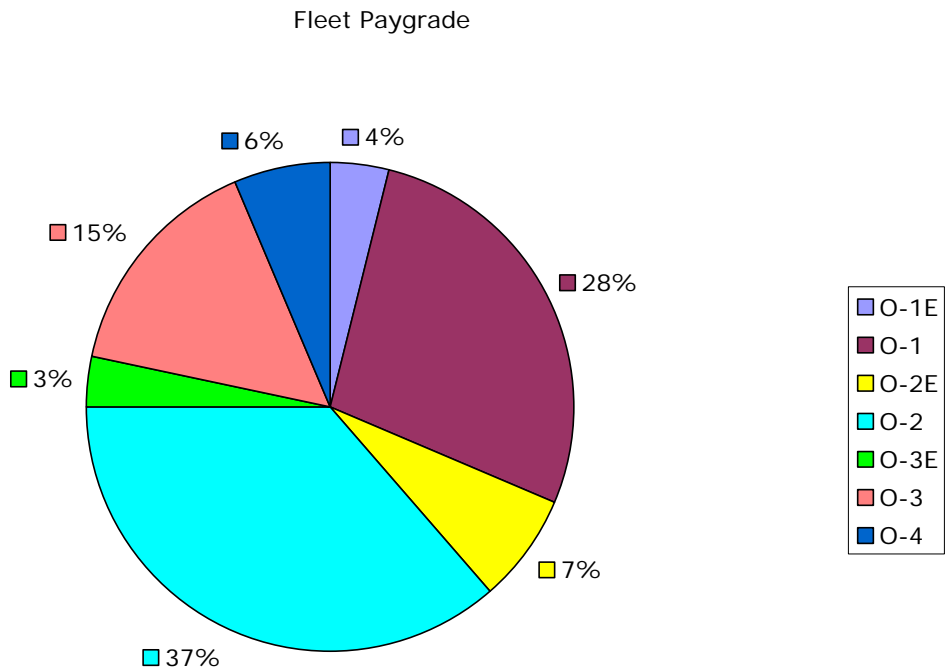


**Figure 50. Fleet Number of Dependents**



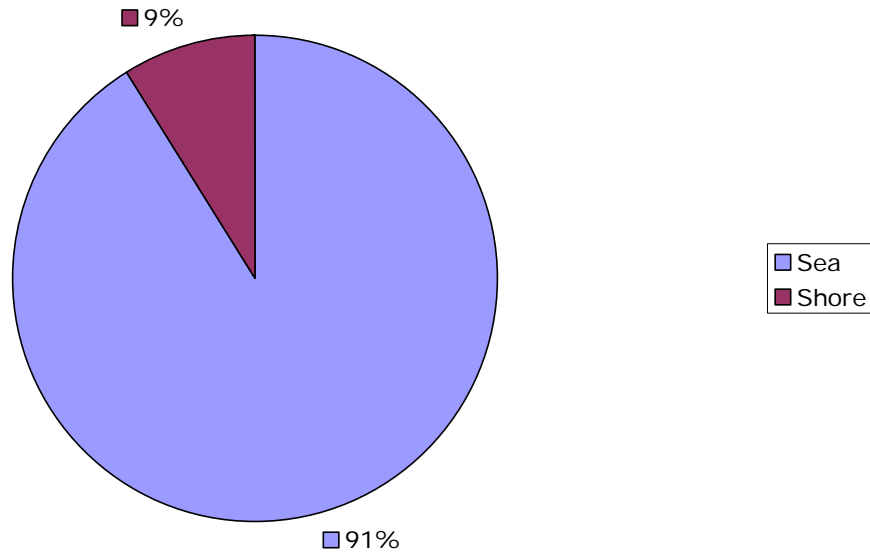


**Figure 51. Fleet Commissioning Source**



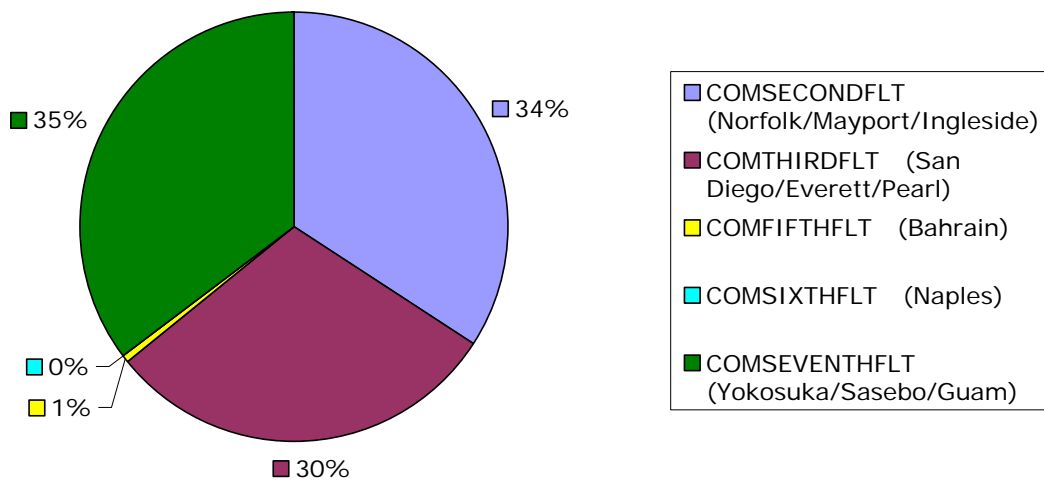
**Figure 52. Fleet Current Paygrade**

Fleet Sea vs Shore



**Figure 53. Percentage of Fleet Respondents on Sea and Shore Duty**

Fleet Homeport



**Figure 54. Fleet Homeport Breakdown**

Fleet Years of Active Duty Service

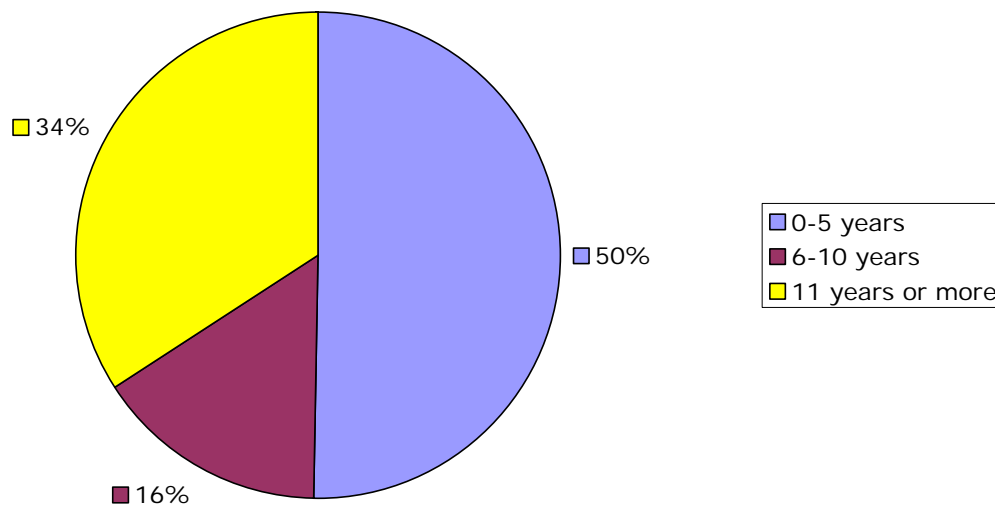


Figure 55. Fleet Years of Active Duty

Fleet Ethnicity

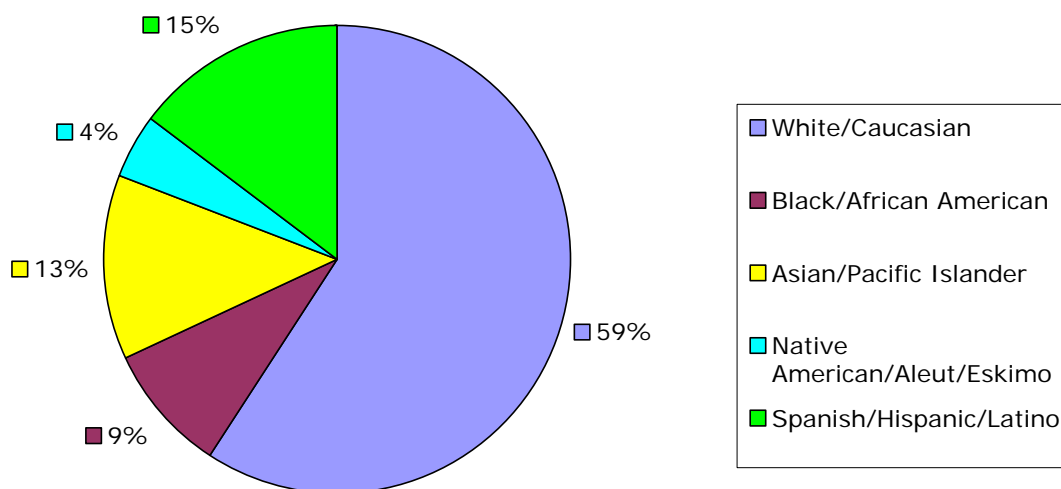
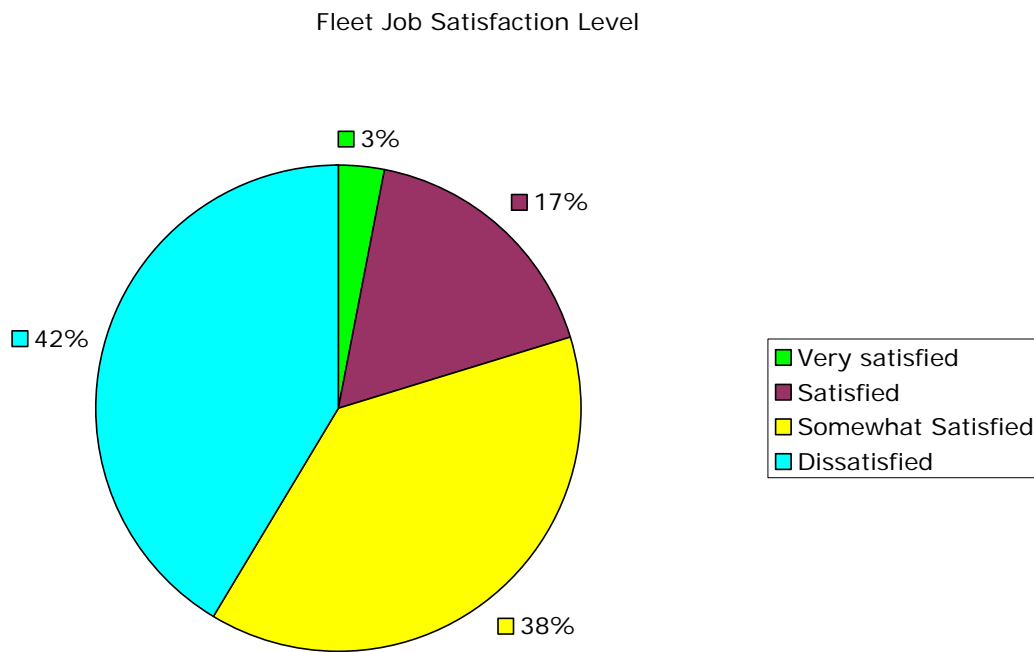
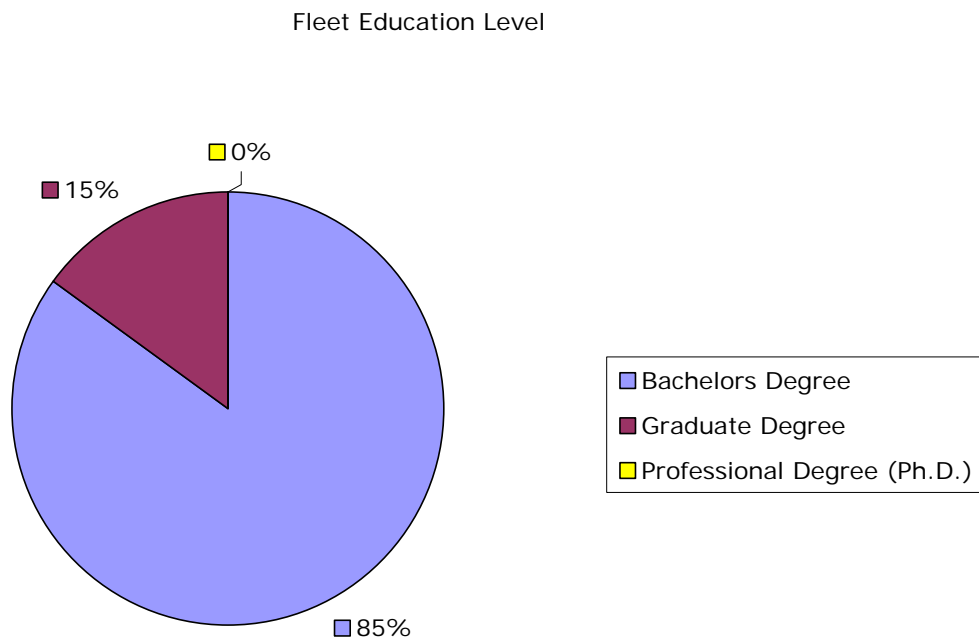


Figure 56. Fleet Ethnicity Breakdown



**Figure 57. Fleet Level of Job Satisfaction**



**Figure 58. Fleet Education Level**

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